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MEMOIRS
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NUMBER 2

THE BLATTIDAE OF NORTH AMERICA

NORTH OF THE MEXICAN BOUNDARY

BY
MORGAN HEBARD

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MEMOIRS
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AMERICAN ENTOMOLOGICAL SOCIETY
NUMBER 2

THE BLATTIDAE OF NORTH AMERICA, NORTH OF THE MEXICAN BOUNDARY[1]

BY MORGAN HEBARD

It has been evident for some time that a number of the names used for the Blattidae of North America have been employed with considerable uncertainty. Many species have been studied from but few specimens, and hardly any comparative work has been done in associating the forms with exotic species of nearest affinity. The much larger series now available has led the author to undertake a general study of the North American forms.

Exceptionally large collections of Blattidae, from the other portions of the New World, have assisted greatly in the formation of conclusions as to the relationships and the relative values of many characters of the forms here considered.[2] Reference to

[1] As the title indicates, the present study treats only those forms found north of the Mexican boundary, and North America in this restricted sense is understood throughout this paper, unless further qualified.

[2] We have published, during the preparation of the present study, the following papers, all having some bearing on the species here treated.

"A New Species of the Genus Neoblattella from Costa Rica." Ent. News, xxvii, pp. 159 to 161, (March 31, 1916).

"The Genus Ceratinoptera." Trans. Am. Ent. Soc., xlii, pp. 125 to 134, (April 8, 1916).

"A New Genus, Cariblatta, of the Group Blattellites." Trans. Am. Ent. Soc. xlii, pp. 147 to 186, (April 26, 1916).

"Certain Features found in the Genus Panchlora, with other Observations and the Description of one New Species." Ent. News, xxvii, pp. 217 to 222, (May 2, 1916).

"Critical Notes on Certain Species of the Genus Blaberus." Ent. News, xxvii, pp. 289 to 296, (June 30, 1916).

"Studies in the Group Ischnopterites." Trans. Am. Ent. Soc., xlii, pp. 337 to 383, (Nov. 15, 1916).

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other considerable collections of Blattidae, particularly those from Africa, has aided, but mainly in affording negative evidence of close affinity, the species examined representing, in the great majority of cases, groups and genera having but little bearing on those at present under consideration.[3]

Generic association of the species was at once found to be a serious problem, the difficulties in the present work being particularly complex in the Pseudomopinae, where two genera, *Blattella* and *Ischnoptera*, were found to include each a large number of valid generic units, while *Kakerlac*, *Ceratinoptera* and *Temnopteryx* have been used as a veritable dumping ground for a varied assortment of perplexing forms, many agreeing only to some extent in the degree of reduction of the tegmina and wings.

Treatment

Detailed descriptions of each genus and species in the present paper were deemed inadvisable, but careful analyses of the features of real differential value are given as well as full descriptions of coloration. Particular attention is also given to the range of variation in each species, as confusion in subsequent work is much the more likely to occur upon encountering features representing mere individual, though striking, variations.

The treatment of certain groups is more detailed than that of the majority. Thus, the very large series of the genus *Parcoblatta* has led us to discuss in detail the species of the group Ischnopterites included in the present study. The confusion which has existed in the group Blattellites has also necessitated a more elaborate study of the genera and the species there considered. In the Polyphaginae, series of intimate significance, from both the southwestern United States and Mexico, have led us to include all our North American material in the present treatment, not confining the study, as almost universally elsewhere, to material from north of the Mexican boundary.

[3] As an example; the African species, which have been described as *Ischnoptera*, now before us, are indeed members of the Group Ischnopterites, but in no case are they referable to *Ischnoptera* s. s., or to any other of the New World related genera.

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Method

The armament of the ventro-cephalic margins of the cephalic femora has been classed as type 1 or A, showing a gradual reduction in size and length of spines distad, and type 2 or B, showing spines which change abruptly from elongate and heavy proximad, to very much shorter and more delicate distad. This distinction is found to be too general, and is only mentioned here when roughly indicating the general character of the armament of these margins as found in certain genera. Generic and even specific differences of degree are found, which can not be characterized properly without detailed description. It would be convenient if, in describing different genera, such terms as "strongly type A" or "type B approaching type A" could be used, but it is clear that for each author, such comparative words would be apt to have a somewhat different significance.

The male sex in many species has been found to have very important diagnostic features in the chitinous processes concealed between the supra-anal and subgenital plates. As these parts have never been used to any extent in systematic studies, we have been obliged to supply the following terms. The orifice in which these processes are found is termed the "anal chamber." The processes themselves are termed the "concealed genitalia," of which the longest and most highly specialized is termed the "genital hook." The function of the various processes as yet remains undetermined.

The exposed portions of the supra-anal and subgenital plates are alone considered in the descriptions of these structures. In the majority of species, the male anal chamber extends to the base of the second ventral (penultimate) abdominal segment preceding the subgenital plate. The subgenital plate is found to extend to this point, though subchitinous in structure in the concealed portion.

Measurements. The body length is found useful, but it must be understood that it would vary in the same specimen in life, due to the contraction or extension of the abdomen; in consequence, when abdominal distortion is evident, the normal length is estimated. The body length is considered as the distance from the

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vertex to the apex of the subgenital plate. The tegminal length, unless otherwise stated, is taken from its base, a brief distance beneath the pronotum, to its apex.

The color terms used are taken from Ridgway's "Color Standards and Nomenclature."

We have not been able to obtain sufficient females bearing oothecae, to determine the real significance of the position in which these egg sacks are carried. Shelford has indicated that, whether the ootheca is carried with suture dorsad or laterad might afford a character in determining the relationship of many forms.[4] We are extremely sceptical on this point, as females before us of *Parcoblatta pensylvanica* have the ootheca with suture both dorsad and laterad, while an example of *Cariblatta punctulata* has the ootheca with suture dorsad and one of the closely related *Cariblatta lutea minima* has the suture laterad. It is possible that, in at least some forms, the ootheca first appears with suture dorsad and is gradually turned until, when fully extruded, it is carried with suture laterad. Studies of living material will be necessary to solve this problem.

Future Field Work Required

The forms upon which future field work should throw additional light, are:

Ischnoptera rufa occidentalis. To determine whether this insect is an established adventive on the Gulf Coast from New Orleans to the Mexican boundary, and to ascertain more about its distribution in Mexico.

Pycnoscelus surinamensis. To find if this insect is parthenogenetic in America; nearly four hundred females have been recorded from this continent, but no males.

Compsodes schwarzi. The female sex is unknown.

In the Mexican species of the Polyphagites, material to prove the synonymy under *Homoeogamia mexicana*, into which will probably fall *guttipennis*, *aequalis* and *azteca;* additional material from different portions of the range of *Arenivaga rehni*, to determine the significance of the tremendous variation found in that

[4] Trans. Ent. Soc. London, 1906, p. 235, (1906).

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species, and additional males of *Eremoblatta hirsuta*, the unique specimen of that sex having suffered from immersion in alcohol.

Diagnostic Values

In considering the various diagnostic features, the most important discovery has been that of the superlative value in many genera of the Pseudomopinae of the form and specialization of the median and dorsal abdominal segments in the male sex. In a number of the species of the genus *Parcoblatta* the specialization there found proves, by far, the most valuable character for separating males.

The characters generally considered in the present paper and their general values are as follows:

Size individually often variable; showing occasionally some slight geographic significance.

Form moderately constant; in many species very different in the two sexes.

Head with shape often of some generic importance, usually difficult to describe. Slight differences are usual between the sexes; very decided differences are found when, in the same species, the males have the tegmina and wings fully developed and the females have these organs decidedly reduced or entirely absent. In such cases the females have the head much simpler than the males.

Interocular space occasionally decidedly variable, but sometimes of diagnostic value; width best compared with width between antennal sockets, or with that between ocelli, when these are present.

Ocelli showing few specific diagnostic features, but differing decidedly in many genera and groups. Usually fully developed in individuals having fully developed tegmina and wings; when reduction in the organs of flight occurs, the ocelli are found to exhibit a similar degree of reduction, and in species or sex showing decidedly reduced or atrophied tegmina and wings, they are usually represented by mere pale spots. When the organs of flight are absent, either in both sexes or only the females of a species, the ocelli are absent in the majority of forms, present, though greatly reduced, in few.

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Maxillary palpi, though differing decidedly in different genera, of little specific diagnostic value. Individual slight variations are found in the length of the three distal joints.

Pronotum in size, form and contour showing frequent generic, occasional specific, diagnostic features. Some variation, however, in such useful features as point of greatest width and depth of discal sulci, when present, almost always occurs. The form varies with reduction in the organs of flight, this most noticeable in a greater truncation of the caudal margins, which makes the laterocaudal angles much more acute, moves the point of greatest width caudad, and develops a more even general convexity of the pronotal surface. Where great differences occur in the organs of flight of the sexes of the same species, the differences in the pronotum are likewise decided.

The tegmina and wings offer features of decided generic importance. These must always be considered with allowances for the forms in which reduction occurs in one or both of the sexes.[5] The general plan of the veins, particularly the direction of the tegminal discoidal sectors, is the most valuable and least variable generic feature, but in some groups the division of certain veins is of decided generic diagnostic value.[6] Differences in the number of rami of certain veins are, in all the forms we have considered, attributable to mere individual variation. In some groups the folding of the wing, intercalated triangle or appendicular field, is of importance, both generic and specific, the lesser differences, of specific value, being subject to slight variations. When reduction in length occurs, particularly when this has reached a decided degree, the general character of such is often of decided specific value in one or both sexes, though occasionally in many species some variation is encountered. The costal veins of the wings sometimes show important features, as do the rami of the discoidal vein.

[5] Much of the worst confusion in the past, both generic and specific, has been due to failure to recognize this factor. Minor differences in venation have also, at times, been incorrectly supposed to warrant specific separation. On the other hand, ignorance of the specific rather than generic value of tegminal and wing reduction, in one or both sexes, led to error in generic designation.

[6] Thus the discoidal vein of the tegmina and wings forks in *Symploce* and *Xestoblatta* alone of the known American genera of the Group Ischnopterites.

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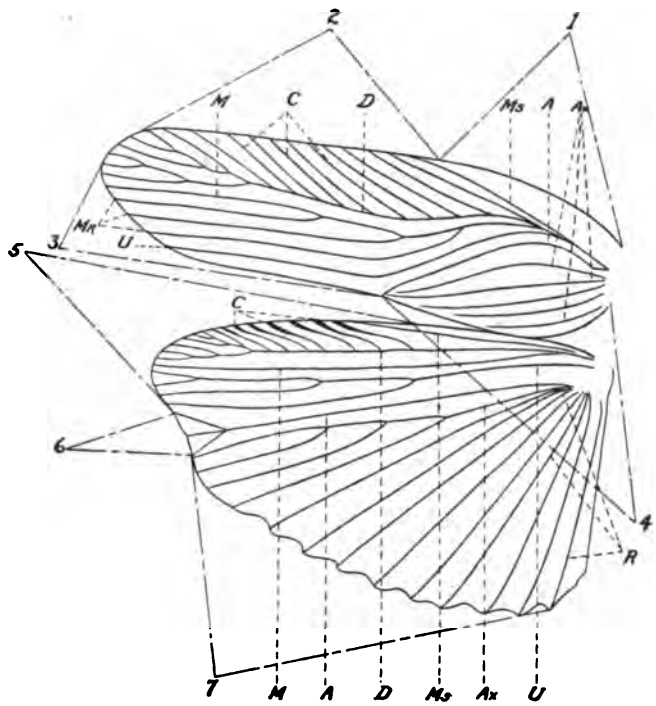

Diagram of the fully developed tegmen and wing of a Blattid.

1. Marginal Field.
2. Scapular Field.
3. Discoidal Field.
4. Anal Field.
5. Anterior Field.
6. Intercalated Triangle.
7. Posterior Field.

Ms. Mediastine Vein.
D. Discoidal Vein.
C. Costal Veins.
M. Median Vein.
Mr. Branches of Median Vein.
U. Ulnar Vein.
A. Anal Sulcus.
Ax. Axillary Vein.
R. Radiate Veins.

This figure is given, with the names used by previous authors for the various fields and veins, by Hebard, Trans. Am. Ent. Soc., xlii, pp. 185 and 186, pl. xiii, (1916).

In species where the area here represented by the Intercalated Triangle, is more extensive and reflexed, it is termed the Appendicular Field.

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The dorsal surface of the abdomen, including the median segment, is greatly specialized in males of many species, and offers fixed characters of the greatest diagnostic importance. This is not true of females, though in some species some differences, usually only of degree, occur.

The supra-anal plate in males of certain species is important in form and structure. The form of this plate has also been considered diagnostic for certain subfamilies, but we have been unable to determine the value of such features. This plate is much more simple in females and often shows variability in contour in many species; in this sex it is rarely of diagnostic importance.

The cerci are of different types in many groups and genera. When specialization occurs, it is normally more decided in the male sex. In some groups specific diagnostic features are found in the male cerci,[7] such is very rare in others.[8]

The genitalia concealed between the male supra-anal and subgenital plates are very often of decided specific diagnostic value. Unfortunately these are difficult to study in dried material.[9] Little of diagnostic value is to be found in the anal chamber of females.

The subgenital plate in males of some species is important in form, its appendages frequently showing other characters of highly diagnostic importance. This plate is represented by a number of distinct types in females,[10] but rarely shows features of specific diagnostic value.

[7] In the genus *Panchlora* the male cercal characters are of great importance in many species. See Hebard, Ent. News, xxvii, p. 218, (1916).

[8] See under *Parcoblatta uhleriana* (Saussure), showing diagnostic specific male cercal characters, alone of the species of Group Ischnopterites here considered. Somewhat similar specialization, but of no diagnostic value, due to its variability, is sometimes found in both sexes of *Parcoblatta pensylvanica* (De Geer).

[9] In the Polyphaginae these features are found to be of the highest importance, but removal of the subgenital plate, before study of dried material, is almost always necessary.

[10] It is particularly interesting to note that a valvular type of the female subgenital plate, which has long been considered an important characteristic of the Blattinae, is also found in the Corydiids, *Holocompsa nitidula* and *Compsodes delicatulus* and in the Polyphagid, *Homoeogamia mexicana*, but of a different general type in these species.

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The styles, present only on the male subgenital plate, have often generic or even higher significance in their general character, though in some genera very distinctive types are found, which are clearly of specific diagnostic value alone.[11] In many species slight but constant differences in the styles are found. It appears that often when the male concealed genitalia are highly specialized, the styles remain simple in structure; while when the male concealed genitalia are more simple, the styles often become highly specialized. The high specialization in these two sets of organs apparently shows in different forms, at least in part, an analogous function. In other groups both concealed genitalia and styles are more simple in structure. In some species no styles are found on the male subgenital plate.

The limbs themselves show few readily describable diagnostic features, but their general character of armament is apparently of the highest value in the arrangement of the groups and also in separating many genera. Slight differences are, with few exceptions, worthless for specific separation. The limbs often differ greatly in the sexes of species where general dissimilarity between males and females occurs, this even extending to the limb armament in certain species. The presence or absence of pulvilli and arolia are of value in associating the groups; rarely these organs show, in their structure, features of specific diagnostic value.

It must be remembered that, until the Blattidae of the world are monographed, the relative values of all the diagnostic features can not be fully determined. The above statements, however, apply fully to the forms here treated and to the exotic material examined.

It is evident that, until such monographic work is accomplished, the validity and proper position of some of the subfamilies will remain in doubt. Thus we can not say whether the Ectobiinae can be separated from the Pseudomopinae by sufficient characters, or whether all of the genera there included are properly located. In fact, exceptions, in different degree, to the majority of the subfamily characters given by Shelford occur. That author had

[11] Note the great diversity of these appendages in the genus *Cariblatta*. See Hebard, Trans. Am. Ent. Soc., xlii, p. 153, (1916).

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indeed made a valiant beginning in the general study of the Blattidae, but it is evident that time and material were lacking for definite conclusions in much of the work accomplished, while his untimely end left many of the vital problems untouched.

Conclusions

In considering these facts, it is at once evident that the males of the Blattidae show a much more intricate development than the females, affording many striking features, which are not only of specific, but also of generic diagnostic value. Indeed, it is clear that, in many cases, the great majority of diagnostic features, of specific or even higher importance, are not to be found in the simplified female structure.

The primary male sexual characters are, in great measure, only of the highest specific importance; but in the general type of the concealed genitalia and of the styles, a certain amount of generic or higher significance is often found.

The secondary male sexual features which frequently have full generic values are: head development, pronotal specialization, character of tegmina and wings and arrangement of certain veins, specialization of median and dorsal abdominal segments and (when much more rarely decided sexual difference occurs) type of limb armament.

The reduced, atrophied or absent tegmina and wings of the females of many species apparently show a wider differentiation from the primitive than do the generally more intricately developed structures of the males. Study of the fossil Blattidae shows few examples among the known forms in which decided reduction, accompanied by truncation, of the tegmina occurred in the female. The males of those species, however, were generally of as intricate structure as those of the present day.

Distribution and Number

The Blattidae are found in North America but little north of the Canadian boundary. In the United States the native species are in most portions few in number, and no forms of this category are known from north of the southern portions of the great central

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western area, including the higher portions of the Great Plains, the Rocky Mountain system and the Great Basin. Only in the very limited tropical areas along the southern border of the United States, extreme southern Florida and the Florida Keys, the Brownsville region of Texas and several even smaller areas along the Mexican line in New Mexico and Arizona, are the species numerous and present in large numbers.

The Pseudomopinae are represented by twenty-four species, all of the other subfamilies by a total of nineteen; totaling forty-three established species and one geographic race, of which ten species are probably established adventives. Of the total, fourteen are found only in the tropical portions of the United States, six of these being established adventive species.

Key to the Males of the Blattidae found in North America, north of of Mexico[12]

A. Ventral margin of femora supplied with numerous spines. (Median and caudal femora with a disto-dorsal genicular spine. Tegmina present. Tarsal claws simple.)

B. Ventro-cephalic margin of cephalic femora armed with a row of heavy proximal spines, succeeded by a row of more slender, shorter, distal spines (type B). (Arolia present.)

C. Fourth tarsal joint alone bearing a pulvillus. Tegmina with oblique discoidal sectors, where these are not obliterated by tegminal reduction.

D. Dorsal surface of abdomen not specialized. Pronotum distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. (Size small.)

E. Tegmina fully developed, extending beyond apex of abdomen. Concealed genitalia unusually highly specialized. Subgenital plate with two very small, rounded styles, slightly longer than wide. Pronotum shining blackish brown, margined laterad and cephalad with buffy, which band, at the latero-caudal angles, crosses the pronotum before the caudal margin, in this transverse portion being broader than elsewhere.

Euthlastoblatta abortiva (Caudell)

EE. Tegmina considerably reduced, truncate, leaving distal portion of abdomen exposed. Concealed genitalia not highly specialized. Subgenital plate with very broad, short styles, in large part fused with the distal margin. General coloration buffy, beautifully marbled and marked

[12] The species of the genera *Parcoblatta* and *Arenivaga* are not included in the present key. Keys to distinguish the males of these species are given under their respective generic discussions.

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with blackish brown. Pronotum buffy, disk bordered rather narrowly with blackish brown and with an anchor-shaped marking of this color, the arms of which are cephalad.....**Aglaopteryx gemma** new species

DD. Dorsal surface of abdomen with sixth segment specialized and succeeding segments transversely constricted. Pronotum not distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Styles elongate, heavy, inset, produced and adjacent mesad. General coloration warm buff.)

E. Head warm buff, with inter-ocular-ocellar area prout's brown, broken mesad by twin spots of warm buff. Interocular space half that between antennal sockets. Concealed process between styles with distal portion slightly broadening and faintly roughened.

Latiblattella rehni new species

EE. Head warm buff, vertex strikingly pale buff, face maculate with prout's brown. Interocular space three-quarters that between antennal sockets. Concealed process between styles with distal portion enlarged, flattening out caudad with margin rounded.

Latiblattella lucifrons new species

CC. Four proximal tarsal joints each bearing a pulvillus. Tegmina with discoidal sectors weakly radiating.

D. Sixth dorsal abdominal segment bearing mesad, at specialization of sixth and seventh segments, two minute, chitinous projections, armed dorso-distad with elongate, delicate teeth. Styles not deflexed, of very unequal bulk. (Subgenital plate strongly asymmetrical. Dextral style heavy, cylindrical, curving weakly sinistrad; sinistral style slender, tapering, straight, not half as long as dextral style. General coloration shining blackish brown. Limbs and spines ochraceous orange.)

Ischnoptera deropeltiformis (Brunner)

DD. Dorsal surface of abdomen either specialized or unspecialized, but never showing armed projections or character of specialization found in *Ischnoptera*. Styles slender, deflexed, cylindrical processes, with rounded apices, the dextral slightly the longer.....**Parcoblatta**[13]

BB. Ventro-cephalic margin of cephalic femora armed with a row of spines which decrease gradually in size and length distad (type A). Four proximal tarsal joints each bearing a pulvillus.

C. Supra-anal plate not bilobate. Form not depressed.

D. Structure moderately delicate. Styles variously specialized; not slender, elongate, straight, symmetrical processes of equal length, situated in sockets on margin of subgenital plate.

[13] A key to the males of the twelve species of this genus is given on page 174.

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E. Ulnar vein of wings without proximal incomplete rami.

F. Tegmina with strongly oblique discoidal sectors. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Abdomen with sixth dorsal segment specialized and succeeding segments transversely constricted. Subgenital plate triangularly produced, with large, elongate styles directed along the margin of the plate toward its apex. General coloration ochraceous-buff. Pronotum with latero-caudal blotches of deep chestnut brown and with disk ochraceous tawny. Tegmina transparent buckthorn brown, paler distad, with a broad, transverse, paler band at apex of anal field.).....**Supella supellectilium** (Serville)

FF. Tegmina with longitudinal discoidal sectors.

G. Tegmina with discoidal sectors not angulate at apex of anal field. Antennae not hirsute in basal half. Pronotum not angulato-produced caudad.

H. Pronotum not distinctively marked. Size small to very small. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Dorsal surface of abdomen unspecialized. Subgenital plate symmetrical. Styles similar, minute, rounded, with dorsal surface armed, situated in brief marginal concavities.

I. Tegmina less reduced, not quite reaching apex of abdomen, 5.2 to 6.6 mm. Produced portion of subgenital plate between styles transverse rectangulate, nearly three times as broad as long.....**Cariblatta lutea lutea** (Saussure and Zehntner)

II. Tegmina more reduced, leaving distal portion of abdomen exposed, 3.6 to 5 mm. Produced portion of subgenital plate between styles subquadrate, very slightly longer than wide.

Cariblatta lutea minima Hebard

HH. Pronotum distinctively marked with paired, moderately heavy, longitudinal lines of deep mars brown. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Abdomen with sixth dorsal segment to and including the supra-anal plate, distinctively specialized. Subgenital plate strongly asymmetrical. Sinistral style very small, rounded; dextral style very minute, not half as large. (Tegmina fully developed, extending beyond apex of abdomen.).....**Blattella germanica** (Linnaeus)

GG. Tegmina with discoidal sectors angulate at apex of anal field. Antennae hirsute in basal half. Pronotum considerably angulato-produced caudad, with apex rounded. (Size medium small. Dorsal surface of abdomen with second, third, sixth and seventh segments specialized. Styles very dissimilar, the dextral showing the greater specialization. Tegmina fully developed, extending beyond apex

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of abdomen. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. General coloration russet to brownish black; pronotum cinnamon rufous, broadly margined with cream color.).....**Pseudomops septentrionalis** new species

EE. Ulnar vein of wings with proximal incomplete rami. (Size medium small. General coloration ochraceous tawny. Tegmina fully developed, extending beyond apex of abdomen; discoidal sectors longitudinal. Discoidal vein of tegmina and wings forked. Pronotum with caudal margin weakly obtuse-angulate produced, with apex broadly rounded. Sixth dorsal abdominal segment specialized. Dextral style small, heavy, cylindrical, with apex flattened and margin produced sinistrad; sinistral style more slender, curved, over twice as long as dextral.)..**Symploce lita** Hebard

DD. Structure heavily chitinous. Femoral spines very heavy. Styles slender, elongate, straight, symmetrical processes of equal length, set in sockets on margin of subgenital plate. (Concealed genitalia complex.)

E. Arolia present. Size large.

F. Tegmina much reduced.

G. Tegmina represented by subquadrate pads, with sutural margins weakly overlapping. General coloration immaculate dark claret brown. Pronotum rarely showing traces of lateral yellow bands. **Eurycotis floridana** (Walker)

GG. Tegmina represented by small, rounded trigonal, lateral pads. General coloration blackish brown, involutely pictured with buffy. **Neostylopyga rhombifolia** (Stoll)

FF. Tegmina and wings fully developed, extending beyond apex of abdomen.

G. Dorsal surface of abdomen unspecialized. Supra-anal plate subchitinous, extending as a hyaline mantle for half its length beyond subgenital plate, the distal portion divided. Cerci very elongate and slender distad. (General coloration reddish brown. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. Tegmina unicolorous.).....**Periplaneta americana** (Linnaeus)

GG. Dorsal surface of abdomen with median segment specialized mesad. Supra-anal plate entirely chitinous, roughly trapezoidal in form. Cerci not as elongate, not as slender distad.

H. Ventral surface of subgenital plate unspecialized. Coloration not solid. General coloration reddish brown.

I. Tegmina unicolorous. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. **Periplaneta brunnea** Burmeister

II. Tegmina deep bay, with marginal field strikingly ochraceous-buff. Pronotum ochraceous-buff with an orange tinge, with two large, sharply defined blotches of black. **Periplaneta australasiae** (Fabricius)

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HH. Ventral surface of subgenital plate specialized. Coloration solid, shining blackish brown.

Periplaneta fuliginosa (Serville)

EE. Arolia absent. Size medium. (Tegmina and wings covering about two-thirds of abdomen, truncate distad. General coloration shining blackish chestnut brown. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, subrectangulate.)

Blatta orientalis Linnaeus

CC. Supra-anal plate weakly bilobate. Form depressed. (Size medium small. Tegmina and wings fully developed, (normally) slightly exceeding apex of abdomen. Ulnar vein of wings with proximal incomplete rami. Pronotum maroon, bordered laterad and cephalad with warm buff, two rotundato-angulate invasions of this color into the disk on each side and one mesocephalad. Concealed genitalia showing a mesal mantle. Subgenital plate asymmetrical, convex. Styles minute, elongate and slender, dextral the longer, situated in a broad, rather deeply concave emargination.[14])

Leurolestes pallidus (Brunner)

AA. Ventral margins of femora unarmed, or supplied with few distal spines.[15]

B. Tegmina present.

C. Tegmina and wings fully developed, extending beyond apex of abdomen.

D. Anal field of wings folding fan-wise. Surface of insect smooth.

E. Wings without an appendicular field. Dorsal surface of abdomen unspecialized. Supra-anal plate weakly bilobate. Four proximal tarsal joints each bearing a pulvillus. Ocellar spots present.

F. Size medium small. Pronotum strongly obtuse-angulate produced caudad, with apex rounded. Arolia present. (General coloration light paris green. Ventral margins of femora frequently with a single, reduced, distal spine on all, or some, of these margins, or unarmed.)

Panchlora cubensis Saussure

FF. Size extremely large. Pronotum subelliptical. Arolia absent. (Coloration blackish brown and buffy. Pronotum buffy, with a large, shield-shaped, shining blackish brown area, in which are striking pale markings. Tegmina, part blackish brown, part buffy. Ventro-cephalic margin of cephalic femora with few stout, proximal spines, succeeded by a closely set row of stout hairs. All ventral femoral margins with single stout, distal spines. Concealed genitalia showing a mesal mantle. Subgenital plate asymmetrical, convex. Styles minute, elongate and slender, dextral the longer, situated in a broad, rather deeply concave emargination.) **Blaberus craniifer** Burmeister

[14] The general character of the male subgenital plate and concealed genitalia shows close agreement with the genus *Blaberus*.

[15] In *Attaphila fungicola*, the ventro-cephalic margin of the caudal femora alone is supplied with several stout spines.

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EE. Wings with an appendicular field. Dorsal surface of abdomen with sixth segment specialized mesad. Supra-anal plate not bilobate. Fourth tarsal joint alone supplied with a pulvillus. Ocellar spots absent. General coloration ochraceous-buff with a tawny tinge. (Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Large arolia present.)

F. Tarsal claws simple. Pronotum nearly deplanate. Subgenital plate with styles inset mesad and produced in elongate and attingent scutes. Appendicular field large, slightly wider than long. Size small.

Chorisoneura texensis Saussure and Zehntner

FF. Tarsal claws specialized, showing on each internal margin two microscopic teeth. Dorsal surface convex, suggesting certain forms of Coleoptera. Subgenital plate with slender, cylindrical styles inset along lateral borders of a subquadrate mesal emargination, the base of which is triangularly produced. Appendicular field very large, much longer than wide. Size very small.

Plectoptera floridana new species

DD. Anal field of wings not folding. Surface of insect hairy.

E. Ocelli present (with surfaces convex). Subgenital plate somewhat asymmetrical.

F. Ocelli minute. Ocellar areas not defined. Tegmina opaque, hairy, with veins very weakly defined proximad; membranous, clear transparent distad. Ventro-cephalic margin of cephalic femora supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines; other ventral femoral margins unarmed. Four proximal tarsal joints each bearing a pulvillus. Moderately well developed arolia present. Size very small. Styles minute, elongate, the sinistral the longer. (Head, underparts and limbs blackish. Antennae each with a pale distal annulus. Pronotum and proximal portion of tegmina black, with a weak, metallic, green-blue sheen.)

Holocompsa nitidula (Fabricius)

FF. Ocelli large. Ocellar areas strikingly defined. Tegmina delicate in structure with veins distinct. Ventral femoral margins unarmed. Pulvilli absent. Arolia absent. Size large to medium small. Styles absent. (Concealed genitalia complex.)

G. Median and caudal femora with a disto-dorsal genicular spine. Ventral margins of femora supplied with numerous stiff hairs. Supra-anal plate produced, delicate in structure, weakly bilobate. Genital hook curved inward. Subgenital plate with surface unspecialized.

Arenivaga[16]

[16] A key to the males of the North American species of the Polyphaginae is given on page 217. The four species of *Arenivaga*, found north of the Mexican boundary, are there tabulated.

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GG. Median and caudal femora lacking a disto-dorsal genicular spine. Ventral margins of femora supplied with very numerous, elongate, silky hairs. Supra-anal plate not produced. Genital hook curved outward. Subgenital plate with surface specialized proximo-sinistrad.....**Eremoblatta subdiaphana** (Scudder)

EE. Ocelli absent. Subgenital plate symmetrical. (Tegmina with veins distinct, discoidal sectors oblique. Ventral margins of femora unarmed. Pulvilli absent. Arolia vestigial. Size very small. Styles small, slender, rather elongate, placed laterad on distal margin. General coloration buffy, diaphanous.).....**Compsodes schwarzi** (Caudell)

CC. Tegmina much reduced. Wings vestigial. (Tegmina rhomboidal, sutural margins overlapping, distal margins truncate. Ventro-cephalic margin of cephalic femora armed with a single, delicate, distal spine; other ventral femoral margins unarmed, except cephalic margin of caudal femora, which is supplied with several stout spines. Pulvilli absent. Large arolia present. Size minute. Subgenital plate asymmetrical, without styles. General coloration amber yellow.).....**Attaphila fungicola** Wheeler

BB. Tegmina absent. (Distal portion of abdomen covered by the produced sixth dorsal and ventral abdominal segments. Subgenital plate concealed, symmetrical, produced. Styles similar, elongate, cylindrical, springing from sharp, brief, latero-distal emarginations of the distal margin of the plate. Size medium, form elongate. Coloration shining blackish brown. Ocelli absent. Pronotum thickened and somewhat hooded cephalad. Cephalic femora with ventro-cephalic margin armed distad with two or three stout spines, ventro-caudal margins of all femora (normally) armed with two similar distal spines, other ventral femoral margins unarmed. Four proximal tarsal joints heavy, each bearing a pulvillus; tarsal claws heavy. Arolia absent.)

Cryptocercus punctulatus Scudder

Key to the Females of the Blattidae found in North America, north of Mexico[17]

A. Ventral margins of femora supplied with numerous spines. (Median and caudal femora with a disto-dorsal genicular spine. Tegmina present. Tarsal claws simple.)

B. Subgenital plate simple. (Arolia present.)

C. Ventro-cephalic margin of cephalic femora armed with a row of heavy proximal spines, succeeded by a row of more slender, shorter, distal spines (type B).

D. Fourth tarsal joint alone bearing a pulvillus. (Tegmina with oblique discoidal sectors, where these are not obliterated by tegminal reduction.)

[17] The species of the genera *Parcoblatta* and *Arenivaga* are not included in the present key. Keys to distinguish the females of these species are given under their respective generic discussions.

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E. Pronotum distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. (Size small.)

F. Tegmina considerably reduced, not reaching apex of abdomen, but not truncate. Pronotum shining blackish brown, margined laterad and cephalad with buffy, which band, at the latero-caudal angles, crosses the pronotum before the caudal margin, in this transverse portion being broader.....**Euthlastoblatta abortiva** (Caudell)

FF. Tegmina considerably reduced, truncate. General coloration buffy, beautifully marbled and marked with blackish brown. Pronotum buffy, disk bordered rather narrowly with blackish brown, and with an anchor-shaped marking of this color, the arms of which are cephalad.....**Aglaopteryx gemma** new species

EE. Pronotum not distinctively and strikingly marked. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. (Size medium small.)

F. Tegmina very slightly reduced, extending beyond apex of abdomen. General coloration warm buff. Head warm buff with inter-ocular-ocellar area prout's brown, broken mesad by twin spots of warm buff. **Latiblattella rehni** new species

FF. Tegmina reduced, not reaching apex of abdomen. General coloration warm buff with an ochraceous tinge. Head warm buff, vertex strikingly pale buff, face maculate with prout's brown. **Latiblattella lucifrons** new species

DD. Four proximal tarsal joints each bearing a pulvillus. (Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Pronotum with caudal margin truncate caudad.)

E. General coloration solid, shining blackish brown, with limbs ochraceous orange. (Tegmina truncate distad, subquadrate pads with sutural margins weakly overlapping. Size medium small.) **Ischnoptera deropeltiformis** (Brunner)

EE. General coloration never solid, shining blackish brown, with limbs ochraceous orange.....**Parcoblatta**[18]

CC. Ventro-cephalic margin of cephalic femora armed with a row of spines which decrease gradually in size and length distad (type A). (Four proximal tarsal joints each bearing a pulvillus.)

D. Supra-anal plate not bilobate.

E. Tegmina not truncate.

F. Tegmina with strongly oblique discoidal sectors. (Size medium small. Tegmina reduced, extending to apex of abdomen. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. General coloration ochraceous-buff. Pronotum with two

[18] A key to the females of the twelve species of this genus is given on page 75.

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latero-caudal blotches of deep chestnut brown and with disk ochraceous tawny. Tegmina tinged with cinnamon brown, with a triangular buffy invasion at the apex of the anal field.)

Supella supellectilium (Serville)

FF. Tegmina with longitudinal discoidal sectors.

G. Tegmina with discoidal sectors not angulate at apex of anal field. Antennae not hirsute in basal half.

H. Pronotum not distinctively marked. Size small to very small. Ventro-cephalic margin of cephalic femora with two heavy, elongate, distal spines. Tegmina reduced, not reaching apex of abdomen.

I. Size averaging larger, 7 to 9.5 mm. Tegmina normally less reduced, 4.9 to 6 mm.

Cariblatta lutea lutea (Saussure and Zehntner)

II. Size averaging smaller, 5.8 to 8 mm. Tegmina normally more reduced, 3.6 to 5 mm.

Cariblatta lutea minima Hebard

HH. Pronotum distinctively marked with paired, moderately heavy, longitudinal lines of deep mars brown. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Tegmina extending beyond apex of abdomen.....**Blattella germanica** (Linnaeus)

GG. Tegmina with discoidal sectors angulate at apex of anal field. Antennae hirsute in basal half. (Size medium small. Tegmina fully developed, extending beyond apex of abdomen. Pronotum considerably obtuse-angulate produced caudad, with apex rounded. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. General coloration russet to brownish black, pronotum cinnamon rufous, broadly margined with cream color.)

Pseudomops septentrionalis new species

EE. Tegmina truncate distad, (subquadrate pads with sutural margins weakly overlapping. Size medium small. Ventro-cephalic margin of cephalic femora with three heavy, elongate, distal spines. Pronotum with caudal margin very weakly angulato-produced. General coloration uniform, chestnut to hazel.).....**Symploce lita** Hebard

DD. Supra-anal plate weakly bilobate. (Size medium small, form depressed. Tegmina and wings fully developed, (normally) falling slightly short of apex of abdomen. Ulnar vein of wings with numerous incomplete rami. Pronotum maroon, bordered laterad and cephalad with warm buff, two rotundato-angulate invasions of this color into the disk on each side and one meso-cephalad.).....**Leurolestes pallidus** (Brunner)

BB. Subgenital plate valvular, with valves terminating proximad in a transverse sulcus. (Structure of insects heavily chitinous. Femoral spines all heavy (type A). Four proximal tarsal joints each bearing a pulvillus.)

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C. Arolia present. Size large.
D. Tegmina much reduced.
E. Tegmina represented by subquadrate pads with sutural margins weakly overlapping. General coloration immaculate, dark claret brown. Pronotum rarely showing traces of lateral yellow bands.
Eurycotis floridana (Walker)
EE. Tegmina represented by small, rounded trigonal, lateral pads. General coloration blackish brown, involutely pictured with buffy.
Neostylopyga rhombifolia (Stoll)
DD. Tegmina little reduced, extending beyond apex of abdomen.
E. Coloration not solid. General coloration reddish brown.
F. Pronotum antimony yellow, with two very large, suffused blotches of chestnut. Tegmina unicolorous.
G. Supra-anal plate with a deep, acute-angulate, median emargination. Cerci very elongate and slender distad. Tegmina and wings averaging more elongate. Size averaging slightly larger.
Periplaneta americana (Linnaeus)
GG. Supra-anal plate with a much less deep median emargination. Cerci not as elongate, not as slender distad. Tegmina and wings averaging less elongate. Size averaging slightly smaller.
Periplaneta brunnea Burmeister
FF. Pronotum ochraceous-buff with an orange tinge, with two large, sharply defined, blotches of black. Tegmina deep bay, with marginal field strikingly ochraceous-buff.
Periplaneta australasiae (Fabricius)
EE. Coloration solid, shining blackish brown.
Periplaneta fuliginosa (Serville)
CC. Arolia absent. Size medium. (Tegmina represented by small, rounded trigonal, lateral pads. General coloration shining blackish brown.)
Blatta orientalis Linnaeus
AA. Ventral margins of femora unarmed, or supplied with few distal spines.[19]
B. Tegmina present. (Median and caudal femora with a disto-dorsal genicular spine.)
C. Subgenital plate simple.
D. Tarsal claws simple. Supra-anal plate weakly bilobate. Ocellar spots present. Four proximal tarsal joints each bearing a pulvillus.
E. Size medium small. Pronotum strongly obtuse-angulate produced caudad, with apex rounded. Arolia present.
F. General coloration brown. Tegmina thickly supplied proximad with minute pits. (Pronotum shining blackish brown margined cephalad,

[19] In *Arenivaga* and *Eremoblatta*, the ventro-cephalic margins of the cephalic femora are alone armed; in the former with chaetiform spines, in the latter with short, conical spines. In *Attaphila fungicola*, the ventro-cephalic margin of the caudal femora alone is supplied with several stout spines.

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or with latero-cephalic traces of buffy. Ventral margins of femora all supplied with a single, stout, distal spine.)

Pycnoscelus surinamensis (Linnaeus)

FF. General coloration light paris green. Tegmina not pitted. (Ventral margins of femora frequently with a single, reduced, distal spine on all, or some, of these margins, or unarmed.)

Panchlora cubensis Saussure

EE. Size extremely large. Pronotum subelliptical. Arolia absent. (Coloration blackish brown and buffy. Pronotum buffy, with a large, shield-shaped, shining blackish brown area, in which are striking pale markings. Tegmina, part blackish brown, part buffy. Ventro-cephalic margin of cephalic femora with few, stout, proximal spines, succeeded by a closely set row of stout hairs. All ventral femoral margins with single, stout, distal spines.) ..... **Blaberus cranilifer** Burmeister

DD. Tarsal claws specialized, showing on each internal margin two microscopic teeth. Supra-anal plate not bilobate. Ocellar spots absent. Fourth tarsal joint alone supplied with a pulvillus. (Size very small. General coloration buffy. Head with a narrow, transverse line of prout's brown between eyes. Ventral surface of abdomen margined with buffy. Dorsal surface convex, suggesting certain forms of Coleoptera. Wings with a very large appendicular field. Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Large arolia present.) ... **Plectoptera floridana** new species

CC. Subgenital plate specialized.

D. Subgenital plate valvular, with bases of valves forming an acute angulation. Insect moderately thickly clothed with hairs. Tegmina opaque proximad; membranous, clear transparent, distad. Wings with unfolded anal field. Ocelli minute, with surfaces convex. Ventro-cephalic margin of cephalic femora supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines; other ventral femoral margins unarmed. Four proximal tarsal joints each bearing a pulvillus. (Moderately well developed arolia present.) Size very small. Head and pronotum yellow, with a brownish orange tinge. Opaque portions of tegmina black, with a metallic, green-blue sheen... **Holocompsa nitidula** (Fabricius)

DD. Subgenital plate with a medio-longitudinal, linear cleft distad. Insect smooth. Tegmina delicate, translucent. Wings with folded anal field (and with an appendicular field). Ocelli absent. Ventral margins of femora, excepting caudal margin of cephalic femora, each supplied with a single, elongate, distal spine. Fourth tarsal joint alone supplied with a pulvillus. (Large arolia present.) Size small. General coloration ochraceous-buff.

Chorisoneura texensis Saussure and Zehntner

BB. Tegmina absent. (Tarsal claws simple.)

C. Median and caudal femora with a disto-dorsal genicular spine. (Surface clothed with hairs.)

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D. Subgenital plate valvular, with bases of valves forming an acute angulation. Cerci much reduced, articulations apparent, apex acute. (Size very small. Ocelli absent. Ventral femoral margins unarmed.)..**Compsodes** [20]

DD. Subgenital plate simple. Cerci very greatly reduced, articulations obsolete, apex blunt. (Pulvilli absent.)

E. Ocellar spots absent. Size minute. Ventro-cephalic margin of cephalic femora armed with a single, delicate, distal spine, other ventral margins unarmed, except cephalic margin of caudal femora, which is supplied with several stout spines. Cerci rounded lobes. Large arolia present. (General coloration amber yellow.).....**Attaphila fungicola** Wheeler

EE. Ocellar spots present, usually very weakly defined. Size large to medium small. Ventral femoral margins unarmed, except for a rather closely set row of short, chaetiform spines in distal half of cephalic margin of cephalic femora. Cerci greatly reduced, blunt conical. Arolia absent. **Arenivaga** [21]

CC. Median and caudal femora lacking a disto-dorsal genicular spine. (Arolia absent.)

D. Subgenital plate simple. Size medium small, form suborbicular. Insect exceedingly hairy. Ocellar spots very weakly defined. Cephalic femora with ventro-cephalic margin bearing a few stout, rather closely placed, conical spines, succeeded distad by a series of very widely spaced, similar spines; otherwise the ventral femoral margins are unarmed, but extremely hairy. Tarsi greatly reduced; pulvilli absent; tarsal claws reduced and scarcely functional.....**Eremoblatta subdiaphana** (Scudder)

DD. Subgenital plate absent, distal portion of abdomen covered by the produced sixth dorsal and ventral abdominal segments. Size medium, form elongate. Insect smooth. Ocelli absent. (Coloration shining blackish brown.) (Pronotum thickened and somewhat hooded cephalad.) Cephalic femora with ventro-cephalic margin armed distad with two or three stout spines, ventro-caudal margins of all femora (normally) armed with two similar distal spines, other ventral femoral margins unarmed. Four proximal tarsal joints heavy, each bearing a pulvillus; tarsal claws heavy. **Cryptocercus punctulatus** Scudder

Acknowledgements

The material treated in the present study totals 5354 specimens, of which 3788 are in the Philadelphia collections.

[20] The female sex is unknown of the single species found in North America, north of the Mexican boundary. The characters here given are of generic significance and are taken from females before us of *Compsodes delicatulus* (Saussure and Zehntner).

[21] A key to the females of the North American species of the Polyphaginae is given on page 217. The four species of *Arenivaga*, found north of the Mexican boundary, are there tabulated.

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Our numerous requests for the loan of other entire collections, or important historic examples, have in every instance met with full compliance. Had it not been for this willing and generous cooperation, it would have been impossible to undertake this task. We would here express our deep gratitude to Mr. James A. G. Rehn of the Academy, Mr. A. N. Caudell of the National Museum, Dr. Samuel Henshaw of the Museum of Comparative Zoology, Mr. Charles Schaeffer of the Museum of the Brooklyn Institute of Arts and Sciences, Dr. F. E. Lutz of the American Museum of Natural History, Dr. E. M. Walker of the University of Toronto, Dr. J. Chester Bradley of Cornell University, Mr. F. Sherman Jr. of the North Carolina Department of Agriculture, Prof. C. P. Gillette of the Colorado State Experiment Station and curators of other institutions, and to Dr. A. P. Morse, Mr. William T. Davis, Dr. Henry Fox, Mr. M. P. Somes, Prof. W. S. Blatchley and Mr. Charles S. Brimley, for the opportunity of examining material in their charge or belonging to their collections.

Subfamily PSEUDOMOPINAE

The transition from the Ectobiinae to the present subfamily is almost indefinable.[22] The typical species of the former have the femoral spines very delicate, and the male supra-anal plate very weakly produced. In the Pseudomopinae the femoral spines are heavier, the male supra-anal plate more strongly produced in typical species. The first division of the Ectobiinae (*Ectobius* and allied genera) have also a distinctive facies,[23] the tegminal venation and form being chiefly responsible for this.

In the first species here considered, we may note that several features show close affinity with the first division of the Ectobiinae; careful consideration of all the features, including the general

[22] See Shelford, Trans. Ent. Soc. London, p. 231, (1906), and Gen. Ins., Fasc. 55, Blattidae, Ectobinae, p. 6, (1907). That author later admits that attempts to define the Ectobiinae and Phyllodromiinae (= Pseudomopinae) have all been unsuccessful, Gen. Ins., Fasc. 73, Blattidae, Phyllodromiinae, p. 2, (1908).

[23] The forms of the second division of the Ectobiinae (*Anaplecta* and allied genera), have a general facies resembling in many ways *Plectoptera* and its allies, which are generally referred to the Oxyhaloinae, and are separated from those forms only by the different character of tegminal venation, wing plication and absence of delicate femoral spines.

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facies, convinces us that, though representing one of the nearly intermediate genera, this insect belongs properly in the Pseudomopinae.

The Group Blattellites

The species of this group are all delicate, this particularly evidenced in the tegminal structure. The tegmina have their discoidal sectors longitudinal, weakly oblique or decidedly oblique to the discoidal vein. The wings have the ulnar vein with rami all complete to the distal margin.

In order to place correctly the North American species of this, the first and largest, group of the Pseudomopinae, we have been obliged to examine carefully our considerable series from the subtropical and tropical regions, south of the southern limits of the United States. The far greater portion of this material is as yet unrecorded, and, during the preparation of the present paper, only such work has been done as was necessary to determine the correct relationship of the forms related to, or confused with, those found over that portion of the continent at present under consideration. Several features of decided importance should, however, be stated here concerning this material.

There is absolute proof that unusually great numbers of species yet undescribed of this group exist in tropical America; all have excellent structural characters, but in the males of different species the genitalic features and secondary sexual modifications of the abdomen are particularly complex and valuable. The group is difficult and almost the despair of the systematist, this latter fact due almost wholly to a universal practice in the past of describing species briefly, usually with no reference to any of the characters of major importance, this naturally resulting in frequent subsequent misidentifications. Until the types of all the old species are fully described, or topotypic material secured (which can often solve such problems), the tropical American species should, whenever treated, be given full and careful consideration with reference to genitalic and other features of importance, mere records in some cases only adding to the difficulties now existing.

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Were more than a small portion of the species of this group conspicuously marked, this would not be so imperative, but in the present group widely separated species of plain coloration often bear to each other an astonishing similarity in superficial appearance.

The enormous number of species and complexity of development makes generic differentiation most difficult in the present group. No single major feature may safely be used for this purpose, but the sum total of important characters found in groups of species should be employed; this of course being the only safe method in any systematic study. That Shelford's generic discussion and erection of five new genera in the present group was hastily done, and far too superficial, is evident.[24]

Of the numerous genera which should properly be referred to the Blattellites, nine valid genera are known from the New World; of these *Blattella* and *Supella* are cosmopolitan,[25] *Ceratinoptera*, *Dendroblatta* and *Neoblattella* are tropical American, never occurring native in the United States, while members of the genera *Euthlastoblatta*, *Aglaopteryx*, *Latiblattella* and *Cariblatta* are native in the United States. We do not believe *Liosilpha* to be a member of the present group, the type of which genus, *pumicata* of Stål, was described from Brazil. So aberrant is *Ceratinoptera* that it may be separated from this group when further study has been accomplished.

The described genera apparently involved, or which have been referred to the present complex, we list below.

	Genotype.	Habitat of Genotype.	Generic Position.
1865. *Ceratinoptera* Brunner	*picta* Brunner	Tropical America	Group Blattellites
1868. *Paraceratinoptera* Saussure			

(Synonymized under *Ceratinoptera* by Hebard.)

[24] Ent. Monthly Mag., 2d ser., xxii, p. 154, (1911).

[25] The first is generally distributed throughout the tropics and temperate regions, the second only throughout the tropics. A single species of each genus is known from the New World, in each case being domiciliary.

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		Genotype.	Habitat of Genotype.	Generic Position.
1869.	*Pseudectobia* Saussure[26]	*luneli* Saussure	India	Subf. Ectobiinae
1874.	*Liosilpha* Stål	*pumicata* (Stål)	Brazil	Not group Blattellites
1895.	*Mallotoblatta* Saussure and Zehntner	*pilosella* S. & Z. (here selected)	Madagascar	Subf. Ectobiinae
1895.	*Desmosia* Bolivar	*alluaudi* Bolivar	Seychelles	Group Blattellites
1895.	*Mareta* Bolivar	*conspicienda* (Stål)	Seychelles	Group Blattellites
1897.	*Onychostylus* Bolivar			
	(Synonymized under *Mareta* by Shelford.)			
1903.	*Blattella* Caudell	*germanica* (Linnaeus)	Cosmopolitan	Group Blattellites
1911.	*Neoblattella* Shelford	*adspersicollis* (Stål)	Tropical America	Group Blattellites
1911.	*Margattea* Shelford	*ceylonica* (Saussure)	Ceylon	Group Blattellites
1911.	*Supella* Shelford	*supellectilium* (Serville)	Cosmopolitan	Group Blattellites
1911.	*Eoblatta* Shelford	*notulata* (Stål)	Tahiti	Group Blattellites
1911.	*Chorisoblatta* Shelford	*liturifera* (Stål)	Mauritius	Group Blattellites
1916.	*Cariblatta* Hebard	*punctulata* (Beauvois)	Tropical America	Group Blattellites
1916.	*Dendroblatta* Rehn	*sobrina* Rehn	Tropical America	Group Blattellites
1917.	*Euthlastoblatta* new genus	*abortiva* (Caudell)	South-central United States	Group Blattellites
1917.	*Latiblattella* new genus	*rehni* new species	Southern Florida	Group Blattellites
1917.	*Aglaopteryx* new genus	*gemma* new species	Southeastern United States	Group Blattellites

Many generic units in the group Blattellites unquestionably occur in the New World, and many others in the Old World, which have not yet been described.

EUTHLASTOBLATTA[27] new genus

This genus is an aberrant member of the subfamily Pseudomopinae, as discussed on page 23. No closely related genera are known.

[26] The only connection this name has with the present group is that Saussure and Zehntner described *Theganopteryx* (*Pseudectobia*) *antiguensis*, which has recently been found to be a synonym of *Cariblatta insularis* (Walker). Hebard, Trans. Am. Ent. Soc., xlii, p. 175, (1916).

[27] From εὔθλαστος = fragile.

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The general appearance and distinctly oblique discoidal sectors of the tegmina would suggest affinity to *Ceratinoptera* sensu strictiore,[28] but the important characters of supra-anal plate, form of limbs, armament of ventro-cephalic margins of cephalic femora and presence of arolia, show wide separation from that likewise distinctive and anomalous genus. With the succeeding genus, *Aglaopteryx*, agreement is found in the very delicate structure, unmodified dorsal surface of male abdomen, more transverse male supra-anal plate than is usual in the group and arrangement of pulvilli, but decided difference is found in the general facies, contour and male genitalia.

The single species, here discussed, occurs in the Brownsville region of Texas.

Genus monotypic. GENOTYPE: *Euthlastoblatta abortiva* [*Anaplecta abortiva*] (Caudell).

Generic Description.—The sexes show moderate differences in size and form. Head not very elongate, evenly rounded; inter-ocular space broad; inter-ocular-ocellar area not flattened; ocellar spots weakly defined. Antennae setaceous. Tegmina when fully developed[29] delicate in structure, discoidal sectors oblique, numerous (ten usual), weakly defined and scarcely distinguishable from parallel channels in each intervening area. Wings when fully developed with area of costal veins broad, these veins enlarged in distal fourth, distal margin of anterior field rather broadly rounded,[30] rami of ulnar vein few. Dorsal surface of male abdomen unspecialized. Supra-anal plate in both sexes strongly transverse, little produced. Limbs stout. Cephalic femora with ventro-cephalic margins armed proximad with a few moderately stout spines, between the more distal of which are situated a few minute piliform spines, these succeeded by a closely set row of minute piliform spines which occupy fully half this margin, succeeded by two long spines of which the more distal is the longest;

[28] See Hebard, Trans. Am. Ent. Soc., xlii, pp. 125 to 134, (1916).

[29] In the only described species the tegmina are fully developed in the male, decidedly reduced in the female.

[30] This is more decided than in the majority of the American species of the Blattellites. This character is used in separating the Ectobiine genera *Theganopteryx* and *Eutheganopteryx*. See Shelford, Ann. Mus. Zool. Acad. Imp. Sci. St. Petersbourg, xvii, p. 56, (1912).

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ventro-caudal margin unarmed except for a shorter distal spine. Median and caudal femora with ventral margins armed with irregularly placed, moderately strong spines and distad with a single spine. Tarsal joints elongate; first three without pulvilli; fourth small, quadrate, with pulvillus occupying all of ventral surface. Arolia present, distinct but small.

Euthlastoblatta abortiva (Caudell) (Plate I, figures 1 to 8.)

1904. *Anaplecta abortiva* Caudell, Mus. Brooklyn Inst. Arts and Sci., Sci. Bull., i, p. 105. [♀, Esperanza Ranch near Brownsville, Texas.]

1913. *Phyllodromica abortiva* Caudell, Proc. U. S. Nat. Mus., xliv, p. 600, fig. 9, p. 603. (Same specimen.)

At first glance the color pattern of this beautiful species suggests that of certain species of *Pseudomops;* it is, however, on closer examination found to be of an entirely different type.

The strongly transverse supra-anal plate, weaker spines of the femoral margins than is usual in the present subfamily and reduced tegmina of the female, led Caudell, who had that sex alone before him, to consider the species a member of the Ectobiinae, as shown in the above references.

The species is very distinct from any of the other forms here treated.

As the male of this species was previously unknown, we here describe a topotypic male, a specimen secured with the type.

Description of Male.—(Esperanza Ranch near Brownsville, Texas.) Size small, form moderately slender. Interocular space broad, slightly narrower than the broad interantennal space, ocellar spots distinct but irregular. Maxillary palpi elongate, with distal joint enlarging decidedly. Pronotum weakly convex, showing a slight latero-caudal discal flattening; outline elliptical, showing a distinct caudal truncation, point of greatest width meso-caudad. Tegmina and wings fully developed, extremely delicate in structure (see generic description). Tegmina with margins of mesal third parallel; apex broadly rounded; mesal field occupying but one-third of costal margin. Supra-anal plate very strongly transverse; dorsal surface weakly concave; very weakly produced between cerci, with free margin transverse, showing a weak convexity and a very feeble median emargination. Within the anal chamber, meso-ventrad, from beneath two large, lateral, chitinous plates, a very wide subchitinous structure, with parts convergent, is produced caudad, with its short, stout, chitinous, distal portion armed above with very thickly set microscopic spines and terminating in a fringe of closely set, curved, spiniform hairs, arranged in a whorl. (Plate I, figs. 4 and 5.) The apex of this remarkable process is consequently flat and normally is carried resting just within the median emar-

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gination of the subgenital plate, between the styles. Subgenital plate with surface rather strongly convex, somewhat asymmetrical; lateral margins elevated, sinistral weakly concave, dextral moderately concave, to brief distal portion, which is decidedly asymmetrical and concave ventrad; at the apices of the plate are situated small styles, slightly longer than wide, rounded and armed dorsad with numerous, separated, minute, short, stiff hairs.

Characters of Female.—Type. (Esperanza Ranch near Brownsville, Texas.) Agrees with male except in the following features. Form distinctly more robust. Interocular space very broad, slightly broader than the very broad interantennal space, ocellar spots weakly defined. Pronotum more ample, weakly convex, without trace of discal flattening; caudal truncation greater, point of greatest width caudad.[31] Tegmina slightly more corneous in structure, decidedly reduced, not reaching distal segments of abdomen; costal and sutural margins arcuato-convergent distad to moderately broadly rounded apex, which is situated mesad; discoidal sectors fewer (due to the tegminal reduction) and even more weakly defined. Wings strongly atrophied, padlike, but folded at juncture of anterior and posterior fields, reaching to median segment. Supra-anal plate strongly transverse, not as much so as in male, weakly triangularly produced, with apex feebly emarginate, showing indications of a weak medio-longitudinal sulcation. Subgenital plate weakly convex, extensively deplanate meso-distad, free margin broadly convex and showing a very weak flattening at the cercal bases.

Measurements (in millimeters)

Brownsville, Texas	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂					
Described Topotype	9.5	2.7	3.9	10.8	3.8
Topotypes.....(7)	9.8–10.4	2.8	4–4.2	10.6–11.2	3.8–4
♀					
Type.....	8.7	3	4.3	6.2	3.2
Topotypes.....(2)	10.2–10.5	3–3.1	4.4–4.6	6.2–6.4	3.3–3.6

Coloration. Pronotum shining blackish brown, strikingly marked with buff (Plate I, Figs. 1 and 6). Dorsum of abdomen shining blackish brown. Tegmina: male, translucent shining sudan brown, gradually becoming paler in shade toward the margins; female, translucent shining deep argus brown, much paler toward costal margins, particularly proximad. Wings hyaline, with veins almost colorless. Head tawny, eyes blackish brown. Antennae, ocellar spots, maxillary palpi and limbs ochraceous-tawny. Ventral surface of body varying in different specimens from blackish to suffused tawny.

[31] This condition clearly accompanies reduction in the tegmina.

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Immature examples have the buff portions of the pronotum relatively somewhat more extensive than in the adults, while the mesonotum and metanotum are also of this color, broadly margined caudad with the dark brown general coloration of the dorsal surface. In some individuals, the lateral margins of the proximal dorsal abdominal segments, the caudal margins of the last two dorsal abdominal segments, the supra-anal plate and the cerci are also of the paler coloration. Beneath, these examples are usually almost uniform, rather pale brown.

In the vicinity of Brownsville, the species was found not uncommon in rats' nests, *Neotoma* sp., under the dense tangle of bushy vegetation, palms and vine tangles, growing near the Rio Grande. In this environment, it was also found in the leaves and dry litter on the ground, and one immature example was taken from the dead petiole of a palm, hanging from the tree.

The species is known only from the material here studied.

Specimens Examined: 18; 8 males, 3 females and 7 immature males.

Brownsville, Texas, V, 7, 1907, (H. S. Barber), 3 juv. ♂, [U. S. N. M.].

Fort Brown, Brownsville, Tex., VIII, 5, 1912, (Hebard; in rats' nests), 6 ♂, 3 juv. ♂, [Hebard Cln.].

Piper Plantation, near Brownsville, Tex., VIII, 3, 1912, (Rehn and Hebard; in leaves and dry litter), 1 ♂, 2 ♀, [A. N. S. P. and Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., VI and VIII, 4, 1904, (C. Schaeffer), 1 ♂, 1 ♀ *type*, 1 juv. ♂, [Bklyn. Inst.].

AGLAOPTERYX [32] new genus

The present genus shows type B[33] armament of the ventrocephalic margin of the cephalic femora, rather strongly deplanate head, widely separated eyes, tegmina with oblique discoidal sectors[34] (these formed by the median vein, its branches and the ulnar vein) and dorsal surface of male abdomen not specialized.

[32] From ἀγλαός = beautiful and πτέρυξ = wing.

[33] As generally understood for the Pseudomopinae; type A, indicates that the ventrocephalic margins of the cephalic femora are armed with a series of spines, all of similar general character; type B, that the series of spines is abruptly contrasted, the more proximal being elongate and heavy, the more distal minute and very slender.

[34] This can not be observed in *A. gemma*, due to the reduction of these organs. The less reduced tegmina of *A. diaphana* are, however, otherwise very similar and show clearly this feature.

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The genus shows nearest relationship to *Mareta*,[35] *Euthlastoblatta* and *Dendroblatta*,[36] the stouter limbs, however, show rather a development toward the type found in *Ceratinoptera*.[37] Though distinct, closer affinity with *Dendroblatta* is indicated.

The genus is apparently confined in distribution to the southeastern United States, the Bermudas, Bahamas and West Indies; it includes two species, *diaphana* (Fabricius) and *gemma* here described.

GENOTYPE: *Aglaopteryx gemma* new species.

Generic Description.—The sexes show but little differences in size and form. Size medium small, form rather broad, structure very delicate for the group. Head broad, eyes widely separated, face evenly and weakly convex, lateral margins from eyes to bases of jaws decidedly convergent. Maxillary palpi short for the group, with last joint as long as, to longer than, penultimate joint. Development of organs of flight of equal degree in both sexes. Tegmina moderately reduced[38] or abruptly truncate,[39] with discoidal sectors, when present, oblique. Wings moderately reduced or absent, when present with venation rather irregular, few costal veins but little enlarged distad and intercalated triangle very small. Dorsal surface of male abdomen not specialized; supra-anal plate very small, transverse, weakly produced; cerci rather short, deplanate above, with about twelve joints. Cephalic femora rather stout; ventro-cephalic margin of same with or without a few long, stout spines proximad, distad always with a closely set row of minute spines, terminated by two very elongate spines. Ventro-caudal margin of cephalic femora unarmed, except for one or two distal spines; ventral margins of median and caudal femora supplied with elongate, moderately stout spines. Tarsal joints appreciably more elongate than in *Euthlastoblatta*, not as decidedly elongate as in *Dendroblatta*, pulvilli similar in these genera. Distinct but small arolia present.

[35] Described by Bolivar, Ann. Soc. Ent. France, lxiv, p. 371, (1895).

[36] Described by Rehn, Trans. Am. Ent. Soc. xlii, p. 231, (1916).

[37] Described by Brunner, Nouv. Syst. Blatt., p. 75, (1865). For definite restriction of this genus see Hebard, Trans. Am. Ent. Soc., xlii, p. 125, (1916).

[38] In *A. diaphana*.

[39] In *A. gemma*.

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Aglaopteryx gemma new species (Plate I, figures 9 to 12.)

The present species has been incorrectly recorded as "*Ceratinoptera*" *diaphana*[40] to which it is closely allied; it is found to differ from that insect, however, in the anchor shaped, not transverse, bar of the dark marking in the pronotal disk; the more reduced and sharply truncate tegmina; absence of wings; dorsal surface of abdomen beautifully maculate with blackish brown, pale red-

[40] **Aglaopterym diaphana** (Fabricius)

1792. *B*[*latta*] *diaphana* Fabricius, Ent. Syst., ii. p. 11. [Islands of South America (West Indies).]

Ceratinoptera diaphana of Brunner and subsequent authors.

This species has been recorded by various authors from the West Indies; all records from the United States by Rehn and Hebard and by Davis (excepting that from Big Pine Key, Florida, which was based on an immature example of *Latiblattella rehni*) apply to *A. gemma*.

In this species the bar of the dark marking in the pronotal disk is normally transverse; the tegmina are reduced, extending slightly beyond, to falling distinctly short of, the apex of the abdomen, but never truncate distad; the wings are present but reduced; the dorsal surface of the abdomen is normally very dark, narrowly margined with buffy; the male subgenital plate is distinctive. This plate is small, convex, irregularly produced, with two large, irregular concavities mesad on the distal margin, occupied by broad styles; the sinistral a brief lobe, broader than long; the dextral large and flattened, with mesal extremity produced in an elongate finger, about three times as long as broad, with tapering but blunt apex directed sinistrad; mesad between the styles the plate is briefly and narrowly produced, this almost equal in length to the sinistral style, while between this and the dextral style is situated an elongate, slender, chitinous, almost straight, sharply pointed projection, extending as far distad as sinistral style. The cephalic femora have the ventro-cephalic margin with distal spines even more elongate than in *gemma*, two or three in number; the ventro-caudal margin is often supplied with other spines beside the distal one.

These observations are based on the following material now before us.

Paget West, Bermuda, I, 2 to V, 17, 1909, (F. M. Jones), 3♂, 3♀, 1 juv. ♂, 2 juv. ♀, 2 very small juv. ♀, [A. N. S. P. and Hebard Cln.].

Hamilton, Bermuda, II, 24, 1910, (E. G. Vanatta), 1 very small juv. ♂, [A. N. S. P.].

Mona Island, Porto Rico, II, 21 to 26, 1914, (in a dead branch, ten feet above ground), 1 juv. ♀, [Am. Mus. Nat. Hist.].

Montego Bay, Jamaica, X, 29, 1913, (Hebard; in bromeliad on forest tree with *Nyctibora laevigata* and numerous *Cariblatta insularis*), 1 ♀, [Hebard Cln.].

Long Ditton, Dominica, VI, 19, 1911, (Crampton and Lutz), 1 ♀, [Am. Mus. Nat. Hist.].

Easy Hall, Barbados, IX, 24, 1902, (H. M. Lefroy), 1 ♀, [A. N. S. P.].

Of this material, the specimen from Jamaica is small and has no markings within the pronotal disk, that from Dominica is unusually large, while that from Barbados has the proportionately longest tegmina of the series.

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dish brown and buffy; very different and more decidedly specialized male subgenital plate and styles, and caudal margin of cephalic femora, which are armed only with a single distal spine.

Type.—♂; Mobile, Alabama. August 26, 1915. (Rehn and Hebard.) [Hebard Collection, Type no. 419.]

Description of Type.—Size small, form rather broad, structure very delicate. Head as given in generic description; interocular space broad but distinctly narrower than the very broad interantennal space; ocellar spots very weakly defined. Maxillary palpi with third and fifth (distal) joints subequal in length, fourth slightly shorter. Pronotum with cephalic margin transverse, lateral margins broadly convex and moderately divergent caudad, caudal margin transverse, very weakly convex mesad and very weakly concave meso-laterad; cephalic angles very broadly rounded obtuse-angulate, caudal angles rather broadly rounded and nearly rectangulate. Exposed portion of tegmina subquadrate, longer than wide, but extending only slightly beyond margin of first dorsal abdominal segment; costal margin very broadly and evenly rounding, at slightly more than a right angle, to sutural margin, which is nearly straight, angle at sutural margin sharply rounded, rectangulate. Seventh and eighth dorsal abdominal segments very narrow and with only caudal margins showing. Supra-anal plate small, transverse, triangularly produced, with lateral margins weakly concave and apex truncate. Cerci not very elongate, twelve jointed, tapering rather sharply distad to acute apex, deplanate above, convex below with decidedly narrow, flattened lateral margins. A mass of subchitinous tissue fills the proximal portion of the anal chamber, from which project mesad, from a chitinous base, two minute, chitinous spines, directed dorsad and curving weakly dextro-caudad. Subgenital plate convex, distad with surface divided into two convex portions terminating in broad sockets, in these rest the very broad and short styles,[41] which are almost completely fused with the plate; sinistral style, a low rounded ridge several times as broad as long and not projecting beyond the lateral margin of the plate; dextral style, a thick, corneous, rounded projection, on the inner margin about twice, on the outer three times, as long as wide, straight, directed diagonally mesad, with apex blunt and not narrowing; this style is strongly concave within and could almost be termed hollow, while in this orifice is situated a moderately stout, chitinous projection, about twice as long as broad, the blunt apex of which does not project beyond the apex of the style; between the styles the brief mesal portion of the distal margin of the plate is weakly and irregularly produced.[42] Limbs and armament of same as given in generic description. Ventro-caudal margin of cephalic femora with only a single spine, this situated distad.

[41] The simple styles in immature males of the present species are heavier than those in the corresponding instars of *diaphana*.

[42] This development is evidently a decidedly greater specialization of structures homologous to those found in *diaphana*.

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Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in the following features. Size slightly larger, form slightly broader. Supra-anal plate very slightly larger than in male, with lateral margins a little less concave, mesad deeply and narrowly cleft for half its length. Subgenital plate ample and convex, little produced and decidedly broader than long; free margin convex, but very weakly concave at cerci.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Mobile, Alabama, *type*		8.7	2.9	4	3.8	2.8
Mobile, Alabama, *paratypes*	(19)	8–8.8	2.8–2.9	3.8–4	3.6–3.8	2.7–2.9
River Junction, Florida	(5)	8.1–8.9	2.7–2.9	3.8–3.9	3.6–3.7	2.5–2.7
Ortega, Florida	(1)	7.5	2.7	3.8	3.5	2.3
♀						
Mobile, Alabama, *allotype*		9	3.1	4.3	4	3
Mobile, Alabama, *paratypes*	(23)	8–9.3	2.9–3.2	3.9–4.3	3.7–4.1	2.7–2.9
River Junction, Florida	(5)	8.6–9.7	3–3.2	4.1–4.3	3.8–3.9	2.7–2.9
Floyd's Island, Georgia	(1)	9.1	2.9	4	3.6	2.7
Miami, Florida	(1)	9.3	3	4.3	3.7	2.7

Very little size variation is found to occur, this entirely irrespective of geographic distribution.

Coloration.—Head ochraceous-buff to ochraceous-tawny, with a broad band of dark chestnut brown between the eyes; in several specimens from extreme southern Florida before us, this marking is continued on the face, forming a large triangular blotch, with a small additional marking at its apex at the clypeal suture. Pronotum transparent buffy; disk marbled with very weak ochraceous orange, bordered rather narrowly with blackish brown, this marking broader and solid caudad to the caudal margin of the pronotum, disk further marked with this color in the shape of an anchor, the two adult females from extreme southern Florida and four of the Bahaman adults have this marking subobsolete. Tegmina

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transparent buffy, the anal field bordered with blackish brown, this heavy along the anal sulcus, continued distad along the remaining brief portion of the sutural margin. Dorsal surface of abdomen blackish brown in lateral fourth, finely marbled with buffy and very weak ochraceous orange; mesal half, including supra-anal plate, buffy, finely marbled with weak ochraceous orange and, in intensive condition, with blackish brown. Limbs and underparts buffy: male with lateral margins of coxae very finely and of abdomen narrowly, blackish brown, the abdomen becomes hazel toward, and including, the subgenital plate; female generally similar, except that the abdomen is very broadly margined laterad with blackish brown, the mesal portion and subgenital plate deep hazel. The females show an average more intensive coloration than do the males. The palest female before us (Floyd's Island, Georgia) has the darkest shades of the dorsum of the abdomen cinnamon rufous.

In the young the color pattern is similar, but with the lines more delicate; the mesonotum and metanotum are narrowly margined caudad with blackish brown.

Ootheca.—This is carried with suture dorsad in position. It is very small, 4.8 mm. in greatest length and 2.8 mm. wide. The sides have each about thirty fine, parallel, longitudinal ridges. The suture is supplied with eighteen well spaced, blunt knobs.

Over its range the species was often found under signs on trees. When exposed, individuals ran over the tree trunk with really astonishing rapidity.

The present species is widely distributed over the southeastern United States, the single Bahaman record given below representing its only known occurrence elsewhere. In addition to part of the material here recorded, the species has been incorrectly recorded as *diaphana* from Billy's Island in the Okeefenokee Swamp, Georgia and from Newberry and Gainesville, Florida.

Specimens Examined: 102; 40 males, 47 females, 4 immature males, 5 immature females and 6 very small immature examples.

Houston, Texas, VIII, 12, 1915, (Hebard; in Spanish moss, *Tillandsia*, on oak), 1 juv. ♀, [Hebard Cln.].

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Beaumont, Tex., VII, 23, 1912, (Hebard; beaten from undergrowth of pine forest and under sign on oak near river), 2 juv. ♂, [Hebard Cln.].

Lafayette, Louisiana, VIII, 9, 1915, (Rehn and Hebard; under sign on oak), 1 juv. ♀, [Hebard Cln.].

Hattiesburg, Mississippi, IX, 11, 1915, (Rehn and Hebard; under sign on sweet gum), 2 ♀, [Hebard Cln.].

Mobile, Alabama, VIII, 26, 1915, (Rehn and Hebard; common under signs on long-leaf pines), 20 ♂, 24 ♀, *type*, *allotype*, *paratypes*, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Springhill, Mobile County, Ala., VIII, 25, 1915, (Rehn and Hebard; under sign on oak), 7 ♂, 5 ♀, *paratypes*, 1 juv. ♂, [Hebard Cln. and A. N. S. P.].

Dothan, Ala., IX, 6, 1915, (Rehn and Hebard; under sign on red oak), 3 ♂, [Hebard Cln. and A. N. S. P.].

Bainbridge, Georgia, IX, 5, 1915, (Rehn and Hebard; under sign on water oak), 2 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Floyd's Island, Okeefenokee Swamp, Ga., XII, 27 to 30, 1913, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Pensacola, Florida, III, 1878, 1 ♀, [M. C. Z.].

River Junction, Fla., VIII, 31, 1915, (Rehn and Hebard; under one sign on oak), 5 ♂, 5 ♀, of these 1 with ootheca, [Hebard Cln. and A. N. S. P.].

Ortega, Duval County, Fla., IX, 6, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Miami, Fla., III, 3, 1916, (Hebard; red mangrove swamp, *Rhizophora mangle*, climbing on roots in afternoon[43]), 1 ♀; III, 4, 1915, (Hebard; Brickell's Hammock, under loose bark on trunk of tree, *Exothea paniculata*, in dense jungle), 1 juv. ♀, [both Hebard Cln.].

Long Key, Monroe County, Fla., III, 13, 1910, (Hebard; under fibers near head of standing cocoanut palm), 1 juv. ♀, 1 very small juv. [Hebard Cln.].

Key West, Fla., I, 20, 1904, (Hebard; under limestone boulder in keys scrub), 1 ♀, [Hebard Cln.].

Nassau, New Providence Island, Bahamas, I, 31 and II, 4, 1905, (A. E. Wright), 2 ♂, 5 ♀, 5 juv., [Morse Cln. and U. S. N. M.].

LATIBLATTELLA new genus

A number of species are here included,[44] some of which show a decided superficial resemblance to certain species belonging to the

[43] Though taken in this very dark situation, the coloration of this specimen is not unusually intensive.

[44] In the collections before us, *rehni*, *lucifrons*, *inornata*, *pavida*, *zapoteca*, *vitrea*, *dilatata* and additional undescribed forms are properly referred to *Latiblattella*. In addition, it is clear from the literature that *chichimeca* and *maya*, both of Saussure and Zehntner, are members of this genus.

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genus *Neoblattella*[45] as recently restricted.[46] From the latter, they are readily separable by the oblique discoidal sectors of the tegmina, type B armament of the ventro-cephalic margins of the cephalic femora, greatly specialized dorsal surface of the male abdomen and other features. Nearest relationship to *Eoblatta* appears to exist.[47]

This genus appears to be confined to tropical America, extending its distribution northward to the extreme southern borders of the United States where a tropical element is found.

It is of interest to note that not a species of the genus is known, or represented in the large collections before us, from the West Indies, though from northern Mexico southward on the continent many occur.

GENOTYPE: *Latiblattella rehni* new species.

Generic Description.—The sexes show weak to very decided differences in size and form.[48] Size moderately large to medium, form moderately broad to very broad, for the group. Head with eyes well separated; inter-ocular-ocellar area distinctly flattened; lateral margins of face distinctly convergent ventrad. Maxillary palpi less elongate than in *Neoblattella*, with distal joint slightly shorter than, to slightly longer than, penultimate joint.[49] Tegmina (in fully developed condition, found in numerous species only in the male) delicate, moderately broad, with costal and sutural margins straight and subparallel in greater part, scapular field very broad; discoidal sectors numerous (usually, including their branches, eight

[45] Shelford's insufficient description has led Caudell to consider *Neoblattella* synonymous with *Blattella*. (Proc. U. S. Nat. Mus. xliv, p. 603, footnote 1, (1913).) The two species mentioned there by Caudell represent, however, not *dilatata* and *adspersicollis* as was then supposed, but the two new and distinct species here described in the present new genus.

[46] Hebard, Trans. Am. Ent. Soc., xlii, p. 148, footnote 3, (1916).

[47] When compared with the description of the genotype of *Eoblatta—notulata*—described from Tahiti, we find that in *Latiblattella* the discoidal sectors of the tegmina are decidedly less oblique, the marginal and scapular fields of the tegmina are narrower and the sexes approximate each other less closely. From our general knowledge of the group, we feel certain that other undescribed characters, of excellent diagnostic value, will be found to occur in *Eoblatta*.

[48] This appears to accompany reduction in the tegmina in the female, in which sex alone such reduction is found in the known species of the genus.

[49] In *Neoblattella*, the third and fourth joints are each normally much longer than the distal joint of the maxillary palpi.

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to ten), moderately oblique.[50] Wings hyaline; costal veins very feebly clavate distad; intercalated triangle small but evident. Tegmina slightly to very greatly reduced in female. Dorsal surface of male abdomen with sixth segment specialized mesad; succeeding segments, (in majority of species), transversely distinctly constricted. Subgenital plate of male fusing and specialized with styles. Subgenital plate of females produced.[51] Cephalic femora with ventro-cephalic margin armed with three to six long, stout spines, succeeded distad by a row of minute, well spaced, piliform spines, terminating in three heavy, elongate, distal spines in increasing ratio. Ventro-caudal margin of cephalic femora and ventral margins of median and caudal femora supplied with elongate, moderately stout spines. First three tarsal joints supplied distad with small pulvilli,[52] brief ventral surface of fourth joint occupied by a pulvillus. Moderately large arolia present.

Latiblattella rehni[53] new species (Plate I, figures 13 to 17.)

1905. *Blattella adspersicollis* Rehn and Hebard, (not *Blatta adspersicollis* Stål, 1860), Proc. Acad. Nat. Sci. Phila., 1905, p. 32. [Miami, Florida.]

1912. *Neoblattella adspersicollis*[54] Rehn and Hebard, (not *Blatta adspersicollis* Stål, 1860), Proc. Acad. Nat. Sci. Phila., 1912, p. 239. [Miami and Homestead, Florida.]

1914. *Neoblattella detersa* Rehn and Hebard, (not *Blatta detersa* Walker, 1868), Proc. Acad. Nat. Sci. Phila., 1914, p. 379. [Homestead, Florida.]

1914. *Neoblattella detersa* Rehn and Hebard, (not *Blatta detersa* Walker, 1868), Journ. N. Y. Ent. Soc., xxii, p. 98. [Lakeland and Everglade, Florida.]

1914. *Ceratinoptera diaphana* Davis, (not *Blatta diaphana* Fabricius, 1792), Journ. N. Y. Ent. Soc., xxii, p. 192. [juv.] [Big Pine Key, Florida.]

The confusion in the present group explains the above misidentifications.[55]

[50] The discoidal sectors are by no means as strongly oblique as in *Supella*.

[51] Never very strongly produced mesad, as in females of many species of *Neoblattella*.

[52] In *L. dilatata* these pulvilli are more extensive, larger than in *L. rehni* or *L. lucifrons*.

[53] We take great pleasure in naming this species, of particular interest in its distribution, for our most intimate friend and co-worker, Mr. James A. G. Rehn.

[54] We have now before us material of *adspersicollis* which can be determined with certainty. It is a very large South American insect, genotype of *Neoblattella*, and is closely related to *N. nahua*, but readily separated from that tropical North American and West Indian species, material of which we have also studied, by excellent genitalic characters.

[55] All of the material upon which these were based is now before us and is listed below.

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Superficially the resemblance of this species to *N. detersa*[56] is remarkable; in the present insect the tegmina are, however, not as long in the female as in the male, while the two species are widely separated by a number of structural characters of the greatest importance.

This species appears to stand first in the genus; the arrangement of the recognized species which should be placed here, is given in footnote 44.

Type.— ♂; Miami, Dade County, Florida. February 7, 1904. (M. Hebard; edge of town under sign on pine, *Pinus caribaea.*) [Hebard Collection, Type no. 406.]

Description of Type.—Size medium, form moderately broad. Head with interocular space equalling half that between antennal sockets; ocelli distinct; interocular-ocellar area distinctly flattened; very small circular areas, with surfaces feebly convex, occur meso-ventrad and adjacent to the antennal sockets. Maxillary palpi with distal joint large, very slightly longer than penultimate joint and nearly as long as third joint. Pronotum but little convex; greatest width meso-caudad; transparent lateral areas but weakly declivent; cephalic margin of pronotum broadly convex, rounding broadly into transverse caudal margin. Tegmina elongate, moderately broad; very delicate in structure; veins very numerous but weakly defined, numerous discoidal sectors (8 often) weakly oblique to sutural margin. Wings very delicate, with veins and some cross-veinlets weakly darkened; costal veins very feebly clavate distad. Abdomen with proximal dorsal segments unspecialized; sixth with a sudden, deep, semicircular depression mesad which touches the cephalic margin, face of depression there supplied with a scant fringe of hairs, immediately caudad of this point the segment is raised in a large blunt knob, with surface covered cephalo-dorsad with a heavy tuft of somewhat agglutinated hairs of equal length, caudad of this knob the segment is subchitinous in texture and shows a weak emargination of the caudal margin, latero-caudal angles of this segment moderately acute-angulate produced with apex bluntly rounded; seventh segment almost hidden; eighth segment no broader and less chitinous in exposed portion, so that the supra-anal plate is clearly visible beneath. Supra-anal plate transverse, triangularly weakly produced with apex rather broad and blunt. Ventro-mesad, within the anal chamber, a soft integument projects from base of subgenital plate, with filaments converging distad and at its apex, just within the median specialization of the subgenital plate, bearing a minute chitinous thorn on the dorsal surface directed caudad and curving ventrad. Dextrad, within the anal chamber, from a moderately elongate, subchitinous integument, projects a slender genital

[56] Topotypic Jamaican series of this distinctive West Indian species, now before us, make it possible for us to give its proper generic position and compare it with the present insect.

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hook, curving strongly dorsad then dextrad but with distal portion straight, hollow, with external face convex but with a faint medio-longitudinal sulcus which terminates just before the rounded apex. Subgenital plate not large, somewhat asymmetrical; with two elongate, heavy, inset plates (the styles) lying dorsad along the nearly straight lateral portions of the distal margin (of which the dextral portion is the more strongly produced), produced and adjacent mesad in slender, flattened projections; the disto-mesal portion of the plate slanting upward, triangularly produced, completely filling the space between the proximal portions of these projections; while within, from base of sinistral projection, a somewhat more strongly chitinous, flattened, cylindrical process is directed dorso-caudad, its apex slightly broadening and faintly roughened, with distal margin rounded, situated between the distal portions of the styles,[67] not enlarged and flattened caudad and in an abruptly different plane to the dorsal surface of the shaft as in *L. lucifrons*. Limbs and armament of same as given in generic description.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Agrees with type except in the following features. Form slightly broader. Head with interocular space wider, about two-thirds as wide as space between antennal sockets. Tegmina slightly, but appreciably, less elongate, with structure as in male. Dorsal surface of abdomen unspecialized. Supra-anal plate triangular in general outline, with a medio-longitudinal sulcus; lateral margins weakly concave, meso-distad the plate is weakly emarginate. Subgenital plate large, scoop-shaped, extending a little beyond apex of supra-anal plate, lateral portions produced and raised, with margin convex to point where cerci project, there rather decidedly obtuse-angulate, rounded emarginate, with remaining portion of free margin convex to a rather deep, longitudinal, linear cleft meso-distad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Ojus, Florida, *paratypes*	(5)	10.7–11.8	3–3.3	4.3–4.7	12.6–13.6	3.4–4
Miami, Florida, *type*		11.9	3.1	4.4	13.7	4
Miami, Florida, *paratypes*	(15)	10.5–11.7	2.8–3.2	4.2–4.5	11.4–13.6	3.4–4
Homestead, Florida, *paratype*		12	3.1	4.3	13.5	4.3
Lakeland, Florida		12.9	3.4	4.7	13.7	4.4

[67] This process can not be seen in any of the specimens before us, without removing either the supra-anal or subgenital plate.

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♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Ojus, Florida....	(5)	10.8–12.2	3.3–3.7	4.4–4.8	10.4–11.3	3.6–3.8
Miami, Florida, *allotype*.....		11.3	3.2	4.5	11.2	3.7
Miami, Florida, *paratypes*.....	(5)	10.9–11.8	3.2–3.5	4.4–4.6	10.3–11.5	3.6–4
Homestead, Florida, *paratype*...		11	3.1	4.5	11.7	3.9

Coloration.—Glossy; warm buff in general coloration. Head warm buff with flattened inter-ocular-ocellar area prout's brown, this broken mesad by twin spots of warm buff; several flecks of prout's brown on face below this marking. Eyes deep mummy brown. Antennae snuff brown, paler proximad. Maxillary palpi sepia, with proximal joints somewhat paler. Pronotum with disk warm buff, supplied with a few[58] very small dots of prout's brown, lateral areas transparent and almost colorless. Tegmina transparent warm buff, with marginal field almost colorless. Wings hyaline, faintly tinged with buffy in area of costal veins, principal veins translucent, dark buffy brown. Dorsal surface of abdomen warm buff, suffused on either side with mummy brown, ventral surface of general coloration, suffused on either side with a moderately broad band of dark mummy brown, which is more decided in the male, the remaining narrow lateral borders pale buffy, both dorsad and ventrad. Cerci prout's brown.

Immature examples are antimony yellow to ochraceous-buff in general coloration, with the darker markings as in the adults more tawny, while the submarginal dark suffusions of the dorsal surface of the abdomen are continued on the metanotum, and frequently this color appears strongly on the mesonotum meso-laterad, immediately within the tegminal projections. In the intensive condition, the dark brown marking is there triangular on each side. This type of coloration prevents confusion of immatures of this species with those of any other Floridian form.

The insect was found very widely distributed throughout the pine woods (*Pinus caribaea*) in extreme southeastern Florida.

[58] In specimens of intensive coloration this area is distinctly speckled, while the inter-ocular dark area is almost solid.

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Though its probable natural daytime habitat is under the bark of these trees, the series was taken almost exclusively under signs on the trunks, sometimes as many as eight or ten examples being under one sign. The insects when disturbed were active, but seldom attempted flight, running about on the trunk to hide in cracks of the bark or dropping to the ground. With them were frequent colonies of *Eurycotis floridana*, more rarely of *Periplaneta australasiae*, while in one case a specimen of *Parcoblatta fulvescens* was noted to be not only more active in its movements, but quick to seek safety in flight.

The material recorded below represents all that has been secured of the present species.

Specimens Examined: 86; 45 males, 23 females, 18 immature individuals.

Newberry, Florida, XI, 19, 1911, (W. T. Davis), 1 juv. ♂, [A. N. S. P.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Fox Cln.]; III, 28, 1912, (W. T. Davis), 1 juv. ♂; V, 5, 1912, (W. T. Davis), 1 ♂, [Davis Cln. and A. N. S. P.].

Fort Myers, Fla., IV, 2, 1912, (W. T. Davis), 1 juv. ♂, [Davis Cln.].

Punta Gorda, Fla., XI, 14, 1911, (G. P. Englehardt), 1 small juv., [A. M. N. H.].

Everglade, Fla., IV, 9, 1912, (W. T. Davis), 1 ♂ [Davis Cln.].

Marco, Fla., IV, 18, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Chuluota, Fla., X, 2, 1902, (H. S. Barber), 1 small juv., [U. S. N. M.].

Deerfield, Fla., III, 1, 1916, (Hebard; under sign on *Pinus clausa*), 1 juv. ♂, [Hebard Cln.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; under signs on *Pinus caribaea*, 1 bred adult III, 16), 4 ♂, 3 ♀, *paratypes*, [Hebard Cln.].

Ojus, Florida, II, 29, 1916, (Hebard; under signs on *Pinus caribaea*, 9 bred adult III, 6 to V, 9), 5 ♂, 5 ♀, *paratypes*, [Hebard Cln.].

Miami, Fla., (Mrs. A. T. Slosson), 1 ♂, *paratype*, [M. C. Z.]; II, 1, 1904, (Hebard), 1 juv. ♀, [Hebard Cln.]; II, 6, 1913, (Hebard; hotel porch, attracted to light on previous night), 1 ♂, *paratype*, [A. N. S. P.]; II, 7, 1904, (Hebard; under sign on *Pinus caribaea* on edge of town), 1 ♂, 2 ♀, *type*, *allotype*, *paratype*, [Hebard Cln. and A. N. S. P.]; II, 28, 1916, (Hebard; under signs on *Pinus caribaea*, portion bred adult II, 29 to IV, 7), 13 ♂, 4 ♀, *paratypes*, 3 juv. ♂, 4 juv. ♀, [Hebard Cln. and A. N. S. P.].

Cocoanut Grove, Fla., III, 3, 1917, (Hebard; under signs on *Pinus caribaea*, portion bred adult III, 3 to 12), 11 ♂, 8 ♀, *paratypes*, 3 juv., [Hebard Cln. and A. N. S. P.].

Homestead, Fla., III, 18, 1910, (Hebard; under bark of pine log, *Pinus caribaea*), 1 ♂, *paratype*; VII, 11, 1912, (Rehn and Hebard; dead in spider web on railroad station, probably attracted to light at night), 1 ♀, *paratype*, [both Hebard Cln.].

Dade County, Fla., (E. A. Schwarz), 4 ♂, [U. S. N. M.].

Big Pine Key, Fla., IX, 19, 1913, (W. T. Davis), 1 juv. ♂, [Davis Cln.].

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Latiblattella lucifrons new species (Plate I, figures 18 to 23.)

1907. *Blattella dilatata* Rehn, (not *Blatta dilatata* Saussure, 1868), Proc. Acad. Nat. Sci. Phila., 1907, p. 26. [♂, ♀, Palmerlee and Huachuca Mountains, Arizona.]

1910. *Blattella dilatata* Rehn, (not *Blatta dilatata* Saussure, 1868), Kansas Univ. Sci. Bull., xv, p. 300. [♂, ♀, Santa Rita Mountains, Arizona, 5000 to 8000 feet.]

At the time the above determinations[59] were made, Saussure's *dilatata* was known only from the female type from Orizaba, Mexico, with the description of which, females of the present species agreed better than with those of any other known species. Though we unfortunately have no topotypic material of that species, we have a pair from San José del Cabo, Lower California, and a male from Sierra El Tosti, Lower California, the latter taken in October, 1893, by Gustav Eisen. These specimens are apparently typical of *dilatata*. When compared with the present species, the males are found to be in general quite similar, but with very distinctive genital characters, of which one of the most striking is the production of the latero-caudal angles of the sixth dorsal abdominal segment and the decided constriction of the seventh and eighth. The female is, in general, quite similar to that sex of the present species, but has the tegmina and wings less reduced, extending, as in the type of *dilatata*, slightly beyond the apex of the abdomen.

The present species shows nearest relationship to *L. rehni*, males of this insect bear to males of that species a close resemblance; they are separable by genital features, by the wider interocular space, strikingly paler vertex and normally decidedly heavier ventro-lateral brown bands. In both sexes the head has the interocular-ocellar area more flattened, with eyes less decidedly projecting laterad, than in *rehni*. The females of the two species are very different; in *rehni* this sex does not differ widely from the male, while in the present species the sexes are very dissimilar, the female having the pronotum much broader with caudal margin nearly straight, while the disk of the pronotum is much more embrowned, as is the dorsum of the abdomen, which is but partly concealed by the considerably more abbreviate tegmina and wings.

[59] All of the material upon which these were based is now before us and is listed below.

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Type.— ♂ ; Santa Rita Mountains, Arizona. Elevation 5000 to 8000 feet. July. (F. H. Snow.) [University of Kansas Collection.]

Description of Type.—Size medium, form moderately broad. Head with interocular space fully three-quarters that between antennal sockets; inter-ocular-ocellar area distinctly flattened; ocellar spots moderately distinct; very small circular areas with surfaces very feebly convex are apparent meso-ventrad and adjacent to antennal sockets. Maxillary palpi with distal joint large, in length not quite equal to penultimate joint, which is shorter than third joint in relatively greater ratio. Pronotum as in *rehni*. Tegmina and wings much as in that species, the wings, however, with veins slightly paler. Abdomen with proximal dorsal segments unspecialized; sixth with a semicircular depression mesad, even deeper and more sharply defined than in *rehni*, fringe of hairs cephalad similar, but with hairs on dorso-cephalic face of knob decidedly shorter, agglutinated and parting from a medio-longitudinal line, caudad of the knob the segment is subchitinous as in *rehni*, but with margin convex, feebly produced, showing very slight emarginations at the latero-caudal bases of the knob, latero-caudal margins of this segment weakly subrectangulate produced with apex bluntly rounded; succeeding segments decidedly constricted, decidedly narrower in transverse section, brief exposed portions of seventh and eighth segments very delicate in structure. Supra-anal plate transverse, weakly triangularly produced with apex weakly bilobate. Ventro-mesad, within the anal chamber, a soft integument projects from base of subgenital plate, with filaments converging distad and terminating in an acute-angulate projection with apex rounded, soft, except narrowly along its dextral margin where it is chitinous, the lateral margin of this chitinous section being thickly supplied with minute, microscopic, chitinous spines, directed cephalo-laterad. Above this integument, a similar but more slender, soft integument extends farther caudad, above from this mantle springs an elongate, spiral, chitinous thorn, longer than the analogous thorn in *rehni*, directed caudad. Subgenital plate not large, somewhat asymmetrical; the disto-mesal section of this plate is produced, directed upward, its margin roughly rotundato-angulate on each side and slightly more produced sinistrad; the mesal portion of the plate is deeply cleft on each side toward its mesal section, the lateral sections thus formed being produced mesad over the mesal section in two slender, flattened projections (the styles), while within from the base of the sinistral process a more strongly chitinous, cylindrical process is directed perpendicularly dorsad, with enlarged apex flattening out caudad with margins rounded, its flattened dorsal surface on a level with the slender projecting apices of the lateral processes. Limbs and armament of same as given in generic description.

Allotype.— ♀ ; same data as type. [University of Kansas Collection.]

Description of Allotype.—Agrees with male except in the following features. Form much broader. Head with interocular space wider, fully four-fifths as wide as

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space between antennal sockets. Pronotum very decidedly broader, with caudal angles much more sharply rounded. Tegmina and wings decidedly reduced, falling slightly short of apex of abdomen, the tegmina more corneous in structure with discoidal sectors fewer (6 often, due to the decided reduction). Dorsal surface of abdomen not specialized. Supra-anal plate broad, triangular in general outline, with apex blunted (in other specimens slightly emarginate), lateral margins weakly concave (in other specimens to varying degrees). Subgenital plate of same type as in *rehni*, but with lateral portions not as much raised, emargination where cerci project less decided and meso-distal cleft shorter.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Santa Rita Mountains, Arizona, *type*		12.3	3.3	4.8	13.7	4.2
Santa Rita Mountains, Arizona, *paratypes*..	(3)	11.9–13.4	3.3–3.4	4.6–4.8	13.9–14.6	4.1–4.2
Huachuca Mountains, Arizona.....		12.1	3.2	4.6	13.7	4.3
♀						
Santa Rita Mountains, Arizona, *allotype*....		12.5	3.8	5.5	8.7	3.7
Huachuca Mountains, Arizona.....	(3)	12.2–13.7	3.7–4	5.3–5.6	8.6–9	3.4–3.8

Coloration.— ♂. Glossy; warm buff in general coloration. Head with vertex strikingly pale buff, ocellar spots of same color, the remaining portions of face maculate with prout's brown. Eyes deep mummy brown. Antennae proximad warm buff, darker beyond specialized joints. Maxillary palpi warm buff somewhat suffused with brown. Pronotum as in *rehni*. Tegmina and wings much as in that species, the latter with veins paler. Dorsal surface of abdomen warm buff, but very broadly suffused on each side with mummy brown, leaving only narrow lateral margins and a mesal line of the paler coloration; ventral surface warm buff suffused on either side with a heavy band of dark mummy brown, the remaining brief lateral borders of these segments narrowly whitish. Cerci prout's brown.

♀. Similar to male, but generally the browns are more tawny. This particularly noticeable on disk of pronotum, which is mottled ochraceous-buff and ochraceous-tawny, with specks of cinnamon.

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Tegmina transparent buckthorn brown. Dorsal surface of abdomen more heavily suffused, mesal line absent in darker specimens. General coloration of ventral surface of abdomen, russet.

Ootheca.—The only ootheca before us is very slightly extruded. We can, however, say that the surface is smooth, the caudal margin perpendicular, feebly convex throughout, the width 3.1 millimeters. It is carried with suture dorsad.

The material recorded below is all that is known of this interesting species.

Specimens Examined: 12; 7 males and 5 females.

Huachuca Mountains, Arizona, (C. Schaeffer), 1 ♂, 4 ♀, [B. I., U. S. N. M. and Hebard Cln.].

Garces, Huachuca Mountains, Ariz., 1 ♂, [U. S. N. M.].

Santa Rita Mountains, Ariz., over 5000 feet, VI, VII, (F. H. Snow), 4 ♂, 1 ♀ with ootheca, *type*, *allotype*, *paratypes*, [Univ. Kansas, Hebard Cln. and A. N. S. P.].

Kit's Peak Rincon, Baboquivari Mountains, Ariz., 4000 feet, VIII, 1, 1916, (Rehn and Lutz; at light), 1 ♂, [A. M. N. H.].

SUPELLA Shelford

1911. *Supella* Shelford, Ent. Monthly Mag., ser. 2, xxii, p. 155.

Of the genera here considered, nearer relationship is found to *Latiblattella*, the present genus differing widely in the conspicuous rounded angulation formed at the juncture of the interocellar space and the ocellar areas, the extremely slender limbs, with cephalic femora showing type A armament of the ventro-cephalic margins and the strongly oblique discoidal sectors of the tegmina.

The genus is known from a single species.

GENOTYPE: *Supella supellectilium* [*Blatta supellectilium*] (Serville).

Generic Description.—Sexes decidedly different in form. Head with eyes well separated; inter-ocular-ocellar area decidedly flattened, raised so that ocellar areas are very sharply defined with rounded angle there formed conspicuous. Tegmina in fully developed condition (only in male) delicate, not broad; discoidal sectors numerous (usually 9 to 11), strongly oblique. Tegmina decidedly reduced in female. Wings hyaline, faintly iridescent; costal veins feebly clubbed distad, intercalated triangle small but evident. Abdomen of male with sixth dorsal segment specialized

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and succeeding segments transversely constricted. Subgenital plate of male fusing and specialized with styles. Subgenital plate of female not strongly produced. Limbs extremely slender. Cephalic femora with ventro-cephalic margin armed with a row of moderately long and rather stout spines, which gradually decrease in length, with distal series short, terminated by two distal spines elongate in increasing ratio. Ventro-caudal margin of cephalic femora unarmed, ventral margins of other femora armed with occasional, irregularly placed, elongate spines. First three tarsal joints very elongate, with minute distal pulvilli, fourth joint subquadrate with distal half of brief ventral surface occupied by a pulvillus. Small arolia present.

Supella supellectilium (Serville) (Plate I, figures 24 to 27.)

1839. *Blatta supellectilium* Serville, Hist. Nat. Ins., Orth., p. 114. [♂, ♀; Mauritius.]

Shelford has established the following synonymy for the present species; *Blatta cubensis*, *capensis* and *phalerata* of Saussure; *Blatta incisa*, *extenuata*, *subfasciata*, *transversalis*, *figurata* and *Ischnoptera quadriplaga* of Walker, and *Phyllodromia delta* of Kirby.

The striking color variation, due entirely to decided intensification and recession, has in part been the cause of the synonymy given above. Though in certain regions distinct types would at first glance seem to exist, further examination shows that such distinction would be untenable, individuals in large series from the same locality always showing an extremely wide range in intensive and recessive coloration.[60] The dissimilarity of the sexes is striking.

Characters of Male.—(Key West, Florida.) Size medium small, form extremely slender. Head elongate; interocular space distinctly narrower than the broad eyes; very small ocellar areas ample and perpendicular to flattened inter-ocular-ocellar area; slightly raised, circular areas present meso-ventrad of, and adjacent to, antennal sockets; face, below transverse ventral margin of inter-ocular-ocellar

[60] Egyptian and South African material before us shows the great variability in the degree of coloration in the present species. The Egyptian examples are very pale, with darker markings weakly defined. The South African specimens are brilliantly colored, with dark markings sharply defined and often with a pale mesal spot on the pronotum; these further show a greater size development than in any other series before us. Nothing warranting geographic racial distinction is to be found.

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area, deplanate for a short distance, then transversely convex, with lateral margins converging ventrad. Maxillary palpi extremely elongate and slender. Pronotum transversely very weakly raised; lateral portions narrow, rather opaque and moderately deflexed, with immediate margins upcurved; caudad, above the insertion of the tegmina, the pronotum, to its disk, is distinctly convex; caudal margin transverse (varying from very weakly convex to very weakly concave). Channels between discoidal sectors of tegmina as pronounced as the veins. Dorsal surface of abdomen unspecialized to fifth segment, there showing a slightly raised and rounded convex ridge mesad at its caudal margin, this ridge forms the cephalic portion of the periphery of a circular, deeply depressed area, mesad on the sixth segment, which is bounded by a slightly raised and rounded ridge and has its floor heavily clothed with agglutinated hairs directed meso-cephalad, thus forming a low, subconical tuft, latero-caudal angles of segment not produced and broadly rounded; seventh segment decidedly constricted, caudal margin transverse; eighth segment and supra-anal plate even more strongly constricted, with caudal margin of eighth segment broadly convex, thus embracing all but distal portion of supra-anal plate. Supra-anal plate narrowly visible, feebly triangularly produced, with apex weakly emarginate. Dorsad the anal chamber is filled proximad by two, irregularly rounded, chitinous plates, flattened caudad, beneath which projects a soft integument, terminated by a small, somewhat twisted, chitinous plate, with ventral margin convex and acute-angulate dorso-distad. Subgenital plate strongly triangularly produced, the lateral margins with a sudden, shallow offset on each side from which spring rather large, elongate, simple styles, directed along the margin of the plate toward its apex, which is convex and rather deeply and narrowly cleft.

Characters of Female.—(Key West, Florida.) Agrees with the male except in the following features. Form moderately stout. Head distinctly broader; interocular space distinctly wider than eyes; ocellar areas decidedly smaller, rounding more sharply into inter-ocular-ocellar area; ocellar spots smaller and feebly defined. Pronotum in general similar but more ample, with contour more even and areas above insertion of tegmina hardly raised. Tegmina much shorter, extending only to end of abdomen and more chitinous in structure; discoidal sectors (usually 8 or 9 and more crowded, due to tegminal reduction) and intervening channels much less strongly defined. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, weakly triangularly produced, with apex briefly rectangulate emarginate. Subgenital plate large and broad, distal margin truncate and very weakly convex, showing a weak, obtuse-angulate, rounded emargination at point where cerci project.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida	11.3	2.8	3.6	11	3.1
Key West, Florida	11.5	2.9	3.7	11.6	3.3

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♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Miami, Florida	12	3.7	4.3	8.2	3.3
Key West, Florida	10	3.4	4.1	8.3	3.3
Key West, Florida	11.8	3.3	4.1	7.8	3.2

Coloration.—♂. Recessive. General coloration ochraceous-buff. Head with occiput to below antennal sockets ochraceous-tawny, face and genae suffused with blackish chestnut brown. Pronotum with disk ochraceous-tawny, remaining portions transparent ochraceous-buff, except latero-caudad, where two blotches of deep chestnut brown occur. Tegmina transparent buckthorn brown, tinged with cinnamon brown proximad, paler distad, sutural margin ochraceous-buff, merging gradually into the darker color, excepting near the apex of the anal field, where a broad band of this paler color crosses the tegmen. Wings hyaline with a faint iridescence, area of costal veins tinged with buffy, this decided mesodistad. Limbs and abdomen unicolorous ochraceous-buff. In the more usual intensive type of coloration the occiput is ochraceous orange, the pronotal disk deep chestnut brown, this color expanding caudad and embracing the entire caudal margin. The tegmina proximad and mesad beyond the pale transverse band are translucent cinnamon brown. Every gradation between these conditions occurs. ♀. Similarly marked but usually of darker coloration than the male. The pale median transverse tegminal band is reduced to a triangular invasion of the more uniformly dark tegmen.

In the immature stages the coloration is similar, but the mesonotum bears two chestnut-brown diffused triangular markings at the caudal margin, immediately within the area occupied by the tegminal pads. The metanotum is uniformly pale. The abdomen is also uniformly pale, except laterad the two proximal dorsal segments are tinged with darker brown, while the entire median segment is dark chestnut brown.

This circumtropical domiciliary species has only become established in the United States in extreme southern Florida. The following series has all been correctly recorded by Rehn and Hebard,

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the Miami specimen having previously been recorded by Rehn as the synonymous *Phyllodromia cubensis* (Saussure).

Specimens Examined: 14; 8 males, 5 females and 1 immature individual.

Miami, Florida, (P. Laurent), 1 ♀, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1913, (Rehn and Hebard; under the counters of a fruit store, in folds of old burlap bags, in company with *Blattella germanica*, *Leurolestes pallidus*, *Periplaneta americana* and *Holocompsa nitidula*), 8 ♂, 4 ♀, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

CARIBLATTA Hebard

1916. *Cariblatta* Hebard, Trans. Am. Ent. Soc., xlii, p. 148.

The present genus, the majority of the species of which are found in the West Indies and northeastern South America, shows much the nearest relationship to the large tropical American genus *Neoblattella*.[61] At the time of publication, the author had not determined the proper position of *Blattella* in the Group Blattellites and, as Shelford had placed *Neoblattella* after that genus, the same course was followed for the present genus. The genus in linear arrangement should, however, follow *Supella* and come before *Neoblattella*, the latter genus preceding *Blattella*.

GENOTYPE, by original designation: *Cariblatta punctulata* [*Blatta punctulata*] (Beauvois).

Generic Characters.[62]—Size small to very small, form moderately slender to distinctly slender for the group. Sexes showing but little difference in size and form.[63] Head with eyes well separated, inter-ocular-ocellar area weakly defined, weakly flattened; ocellar areas not strongly defined. Pronotum weakly convex, lateral margins convex, caudal margin convex truncate. Tegmina (in normally full developed condition[64]) delicate, not broad; discoidal sectors few (in the majority of species 5, in *insularis* and possibly *punctipennis* often 6), longitudinal. Wings hyaline, weakly to

[61] This genus was compared with *Cariblatta*, Trans. Am. Ent. Soc. xlii, p. 148, footnote 3.

[62] The original description of the genus is much more detailed, only the most important characters being here given.

[63] Though but slight differences in size and form are found in the sexes of *lutea*, the sexes of this species are distinctly more dissimilar than those of any of the other species of the genus.

[64] The only known species of the genus, in which distinct reduction of the organs of flight occurs, is *lutea*.

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distinctly iridescent[65]; costal veins strongly and briefly clubbed distad; intercalated triangle small but evident. Dorsal surface of male abdomen not specialized. Subgenital plate of male simple or greatly specialized, symmetrical or asymmetrical; styles of varied distinctive types. Femora slender. Cephalic femora with ventro-cephalic margin supplied proximad with (usually four) long, widely spaced spines, the more distal shortest, succeeded distad by a more closely set row of shorter spines, terminated by two long spines, the more distal the longer; ventro-caudal margin with two, widely spaced, long spines meso-distad and a single long distal spine. Other ventral femoral margins supplied with long spines. First three tarsal joints very elongate, each supplied distad with a minute pulvillus[66] produced in an elongate acute process; fourth tarsal joint subquadrate, with distal half of brief ventral surface occupied by a similar pulvillus. Small arolia present.

The genus is now known to include ten species and one geographic race.

Cariblatta lutea lutea (Saussure and Zehntner) (Plate II, figures 1 and 2.)

1893. *Ceratinoptera lutea* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 48. [♂, ♀: Georgia, Louisiana.]

The present species divides into two races in the United States. The present race is widely distributed over the southeastern United States, but is replaced by *lutea minima* in southern peninsular Florida and in the Florida Keys. A single exotic specimen, from Baños San Vincente, Pinar del Rio, Cuba, is before us, a female referable to *lutea lutea*.

This insect is much the smallest of the known species of the Blattellites found in the United States. It is ochraceous-buffy in general coloration, with head usually showing a transverse band of bister between the eyes and occasionally below this, one, rarely two, lesser bands of the same color. The pronotum is finely pictured with snuff brown to bister.

In the reduction of tegmina and wings the present species is distinct from the other known forms of the genus, of which near relationship is shown to the genotype, *C. punctulata*. From that

[65] In *Cariblatta imitans* Hebard, alone, the wings show no trace of iridescence.

[66] This condition is also found in *Neoblattella*.

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species, as well as from *lutea minima*, the present race may be distinguished, in the male, by having the distal margin of the subgenital plate between the specialized styles broadly and rather weakly produced, the produced portion forming a strongly transverse rectangle. Females of *lutea lutea* can be separated from those of *lutea minima* only by their average larger size and less abbreviate tegmina. These features readily distinguish *lutea lutea* from any other form found over the regions here under consideration; a full description with extensive comparisons has recently been published.[67]

Measurements (in millimeters) of extremes in series[68]

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(6)	5.8–8.1	1.8–2.1	2.6–2.8	5.2–6.6	2–2.1
♀	(14)	7–9.5	2.2–2.6	2.8–3.6	4.9–6	2.1–2.6

The extremes given appear to be due almost wholly to individual variation.

The young of this species have the markings of the head and pronotum averaging more intensive than in the adults, with dorsal surface of abdomen dark, maculate with ochraceous-buffy mesad and laterad.[69]

The species is in large part terrestrial, being usually found among dead leaves and litter on the ground. Occasional specimens are, however, sometimes beaten from bushes. Individuals are decidedly active and are usually found in the greatest numbers in sandy situations.

Specimens Examined: 51; 10 males, 31 females and 10 immature individuals.

Roanoke Island, North Carolina, VII, 25, (G. P. Englehardt), 1 ♀, [Bklyn. Inst.].

Raleigh, N. C., VI, 8, 1905, 1 ♀, [A. N. S. P.]; VI, 23, 1904, (C. S. Brimley; under rubbish), 1 ♀, [Hebard Cln.].

[67] Hebard, Trans. Am. Ent. Soc., xlii, pp. 165 to 170, pl. xiii, fig. 3, (1916).

[68] Table given in full, Trans. Am. Ent. Soc., xlii, p. 167.

[69] In the generic study by the author, two very small immature examples of *Parcoblatta* sp. indet. from Southern Pines, North Carolina and Atlantic Beach, Florida, and one immature individual of *Chorisoneura texensis* Saussure and Zehntner from Natchez, Mississippi, were unfortunately recorded as this insect. These incorrect determinations do not affect the known distribution of the race, which distribution is defined by the records given below and the Louisianan and Cuban examples mentioned above. The coloration of the young of *lutea* is distinctive.

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Fayetteville, N. C., IX, 9, 1911, (Rehn and Hebard; under dead oak leaves), 1 juv. ♂, [Hebard Cln.].

Southern Pines, N. C., VI, 17 to VII, 22, 1914 and 1915, (A. H. Manee), 1 ♂, 4 ♀, [Davis and Hebard Cln.].

Wrightsville, N. C., IX, 7, 1911, (Rehn and Hebard), 1 juv. ♀, [A. N. S. P.].

Swansea, South Carolina, VIII, 6, 1911, (F. Knab), 1 ♀, [U. S. N. M.].

Thompson's Mills, Georgia, (H. A. Allard), 2 ♂, 1 ♀, 1 juv. ♀, [U. S. N. M.].

Macon, Ga., VII, 31, 1913, (Rehn and Hebard; undergrowth of short-leaf pine and oak woods), 1 ♀, not retained.

Warm Springs, Ga., VIII, 9 and 10, 1913, (Rehn; beaten from undergrowth), 1 ♀, 1 juv. ♀, [Hebard Cln.].

Albany, Ga., VIII, 1, 1913, (Rehn and Hebard; under needles in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Thomasville, Ga., XII, 31, 1902, (Hebard; in dead oak leaves), 3 juv. ♂, [Hebard Cln. and A. N. S. P.].

Spring Creek, Ga., VI, 7 to 23, 1911, (J. C. Bradley), 3 ♂, 5 ♀, [Ga. State Cln., A. N. S. P. and Hebard Cln.].

Isle of Hope, Ga., IX, 3, 1911, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

St. Simon's Island, Ga., IV, 22 to V, 12, 1911, (J. C. Bradley), 2 ♀, [A. N. S. P. and Ga. State Cln.].

Billy's Island, Okeefenokee Swamp, Ga., VI, 1912, (J. C. Bradley), 2 ♀, [Cornell Univ. and Hebard Cln.].

Suwannee Creek, Okeefenokee Swamp, Ga., VIII, 28, 1911, (Rehn and Hebard), 1 ♀, [A. N. S. P.].

Jacksonville, Florida, (T. J. Priddey), 2 ♀, [Hebard Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♀, [A. N. S. P.].

Ormond, Fla., III, 12 and 20, 1899, (W. S. Blatchley), 2 ♂, [A. N. S. P. and Hebard Cln.].

La Grange, Fla., IX, 10, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Lakeland, Fla., VI, 8, 1912, XI, 8, 1911, (W. T. Davis), 1 ♂, 2 ♀,[70] [A. N. S. P. and U. S. N. M.].

Carrabelle, Fla., IX, 2 and 3, 1915, (Rehn and Hebard; beaten from heavy scrub in damp spot of sand dune area and from high bush, *Ilex lucida*, fringing inland swampy areas), 2 ♀, [Hebard Cln. and A. N. S. P.].

River Junction, Fla., VIII, 31, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Springhill, Mobile County, Alabama, VIII, 25, 1915, (Hebard; undergrowth in long-leaf pine woods), 1 ♀, [Hebard Cln.].

Mouth of Mary Walker Bayou, Mississippi, (C. B. Moore), 1 juv. ♂, [A. N. S. P.].

Natchez, Miss., VI, 15, 1909, (E. S. Tucker; at sugar), 1 ♂, [U. S. N. M.].

[70] These specimens show a tendency toward *lutea minima*; the male has the production of the subgenital plate only twice as broad as long.

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Cariblatta lutea minima Hebard (Plate II, figures 3 to 5.)

1916. *Cariblatta lutea minima* Hebard, Trans. Am. Ent. Soc., xlii, p. 170, pl. XIII, fig. 4. [♂, ♀; localities listed in present paper.]

This geographic race is confined to southern peninsular Florida and the Florida Keys. It may be separated from typical *lutea* by the average smaller size; average paler and more yellowish buff, rather than distinctly cinnamon, tones of general coloration; more decided tegminal reduction, particularly in the male sex, in which these organs show fully as much reduction as in the female; apparently always vestigial wings, and by the narrower median production of the male subgenital plate.

Type.—♂; Miami, Florida. March 3, 1915. (M. Hebard.) [Hebard Collection, Type no. 418.]

Description of Male.—Type. Size very small, form slightly more robust than is normal in typical *lutea*. Pronotum with point of greatest width at the latero-caudal angles, caudal margin nearly straight, more truncate than in this sex of *lutea*.[71] Tegmina decidedly reduced, reaching only to base of seventh dorsal abdominal segment; with three longitudinal discoidal sectors (thus the median vein branches but once) and no cross-veinlets. Wings vestigial. Supra-anal plate as in typical *lutea*. Subgenital plate as in that race, but with specialized styles slightly closer to each other and production of intervening portion of distal margin very small, subquadrate, very slightly longer than wide.

Allotype.— ♀; Miami, Florida. March 14, 1916. (M. Hebard.) [Hebard Collection.]

Description of Female.—Allotype. Similar to male, but larger and distinctly more robust. Pronotum slightly broader, caudal margin straight, truncate. Tegmina and wings much as in male, except that dextral tegmen has four discoidal sectors. Supra-anal plate very small, strongly transverse, weakly produced, with distal margin showing a small, short, median concavity. Subgenital plate as in typical *lutea*.

Measurements (in millimeters) of extremes in series

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(29)	5.4–7.7	1.8–2.1	2.6–3.1	3.6–5	1.7–2
♀	(53)	5.8–8	2–2.3	2.7–3.3	3.6–4.7	1.8–2.2

[71] As we have found elsewhere in the Blattidae, tegminal reduction appears to be accompanied by a broadening of the pronotum, with a lessening of the convexity of the caudal margin and a coincident shifting caudad of the point of greatest pronotal width. The pronotal features given above show rather this adjustment than what might appear, to the casual observer, to be features separating the present race from *lutea lutea* and the species widely from the other members of the genus.

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The flattening of the caudal margin of the pronotum is more pronounced in this race, which shows normally greater tegminal and wing reduction than does typical *lutea*.

The young of this race are inseparable from those of *lutea lutea*. The habits of the insect agree fully with those of the more northern race; but, when present, we have found *lutea minima* decidedly the more numerous.

The single ootheca before us is 1.8 mm. in depth. The dorsal and ventral margins are parallel and very slightly curved, the dorsal (suture) being supplied with widely spaced, minute knobs[72]; the divisions of the egg sacks are distinctly indicated on the weakly roughened, moderately convex sides, by widely spaced vertical ines. The single example before us bearing an ootheca, is carrying this egg case with suture laterad.[73]

Specimens Examined: 120; 44 males, 66 females, 10 immature individuals.

Punta Gorda, Florida, XI, 14 to 16, 1911, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.]; (Mrs. A. T. Slosson), 1 ♀ with ootheca, [Hebard Cln.].

Fort Myers, Fla., III, 29 to V, 20, 1912, (W. T. Davis), 2 ♂, 2 ♀, [Davis Cln.].

Citrus Center, Fla., V, 2, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

South Bay, Lake Okeechobee, Fla., IV, 30 to V, 2, 1912, (W. T. Davis), 11 ♂, 24 ♀, 1 juv. ♀, [Davis and Hebard Clns.].

Marco, Fla., IV, 19, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Everglade, Fla., IV, 5 to 13, 1912, (W. T. Davis), 10 ♂, 23 ♀, [Davis Cln., A. N. S. P. and Hebard Cln.].

Chokoloskee, Fla., IV, 8, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

Miami, Fla., III, 4, 1916, (Hebard; Musa Isle, under dead petioles of cocoanut palm on sandy soil in grapefruit grove), 8 ♂, 5 ♀, *paratypes, allotype*, 2 juv. ♂; III, 8, 1915, (Hebard; Brickell's Hammock, on ground under luxuriant undergrowth in opening of forest), 1 ♂, *type*, [Hebard Cln.]; III, 20, 1910, (Hebard), 1 ♂, *paratype*, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Virginia Key, Fla., III, 11, 1915, (Hebard; under dark, water-soaked leaves in heavy red mangrove (*Rhizophora mangle*) swamp), 1 juv. ♂, [Hebard Cln.].

Homestead, Fla., III, 17 to 19, 1910, (Hebard), 1 ♂, *paratype;* VII, 10, 1912, (Hebard; under board in everglades), 1 ♂, *paratype*, [both Hebard Cln.].

Key Largo, Fla., III, 18, 1910, (Hebard), 1 ♀, *paratype*, [Hebard Cln.].

Long Key, Fla., III, 13 and 17, 1910, (Hebard; under dead petioles of cocoanut palm on moist ground), 4 ♂, 3 ♀, *paratypes*, 2 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

[72] In *C. punctulata* these projections are bluntly triangular and not widely spaced.

[73] In a specimen of *C. punctulata* before us, the ootheca is carried with suture dorsad. It is known to be carried in both vertical and horizontal position in *Parcoblatta pensylvanica*.

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Key West, Fla., I, 20, 1904, (Hebard), 1 ♂; III, 15 to 16, 1910, (Hebard; under boards, short grass in open), 1 ♂, 4 ♀, 1 juv. ♀; VII, 7, 1912, (Rehn and Hebard; leaf mould in jungle key scrub), 1 ♂, [all Hebard Cln. and A. N. S. P.].

BLATTELLA Caudell

1839. *Phyllodromia* Serville, Hist. Nat. Ins., Orth., p. 105.
1903. *Blattella* Caudell, Proc. Ent. Soc. Wash., v, p. 234. (New name given for preoccupied *Phyllodromia*.[74])
1911. *Blattella* Shelford, Ent. Monthly Mag., 2d ser., xxii, p. 154. (Genus restricted.)

Though numerous Asiatic and African species belong to the genus as restricted by Shelford, the cosmopolitan genotype alone occurs in America.[75]

GENOTYPE: *Blattella germanica* [*Blatta germanica*] (Linnaeus), designated by Caudell in 1903.[76]

Generic Description.—Sexes only slightly different in form. Head with eyes well separated, area between eyes and antennal sockets not flattened, ocellar areas weakly defined. Tegmina (in fully developed condition, found in the large majority of species) delicate, narrow; discoidal sectors not numerous (usually about 6), longitudinal. Wings hyaline, not iridescent; area of costal veins narrow, costal veins feebly clubbed distad, ulnar vein with minimum branches for group (in genotype normally showing but one fork, occasionally simple or bi-ramose), intercalated triangle small. Abdomen of males with sixth dorsal segment specialized and with succeeding segments specialized in outline. Supra-anal and subgenital plates of male variously produced. Subgenital plate of female convex, truncate. Limbs moderately slender. Cephalic femora with ventro-cephalic margin supplied with a few moderately elongate, heavy spines, grading evenly distad into a series of more frequent, shorter, moderately heavy spines, terminated by three longer spines in increasing length ratio distad; other femoral margins with a few elongate, moderately stout spines. Tarsal joints elongate, first three each with a very small, rounded

[74] Preoccupied by *Phyllodromia* of Zetterstedt (Diptera), described in 1837.

[75] At the present time we can not determine the number of species properly referable to this genus. Numerous species certainly belong here, which are referred to in the literature as "*Phyllodromia*" and one, at least, as "*Ceratinoptera*."

[76] Proc. Ent. Soc. Wash., v, p. 234.

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pulvillus distad, fourth joint with distal half supplied with a small pulvillus. No large arolia present.

Blattella germanica (Linnaeus) (Plate II, figures 6 to 9.)

1767. [*Blatta*] *germanica* Linnaeus, Syst. Nat., ed. xii, i, p. 668. [Denmark.]

The established synonyms of this species are *Blatta obliquata* Daldorff and *Ischnoptera bivittata* Thomas.

The pale coloration, with two, dark, parallel, longitudinal bands on the pronotum, and small size of the present insect serve readily to distinguish it from any of the other species here considered. Many of the exotic species of the present genus agree closely with *germanica* in general appearance, but are easily separated by very striking primary and secondary male genital features.

Characters of Male. (Miami, Florida.) Head elongate, more evenly rounded in contour, with eyes not as much projecting as in the majority of the species of the Blattellites; interocular space three-quarters as wide as space between antennal sockets; ocellar spots distinct; face very weakly flattened mesad below ocelli, lateral margins below eyes weakly convergent ventrad. Maxillary palpi short for group, third and fifth joints subequal in length, fourth joint slightly shorter than either. Pronotum transversely weakly convex; lateral portions not broad, moderately deflexed and very weakly opaque; caudal margin very feebly and bluntly obtuse-angulate produced. Tegmina elongate. Dorsal surface of abdomen unmodified to sixth segment, with latero-caudal angles of segments weakly produced and broadly rounded; sixth segment with latero-caudal angles more produced and caudal margin deeply brace-shaped emarginate, the broad meso-proximal area occupied by two, deep, rounded, transverse fossae, separated by a narrow, high, medio-longitudinal ridge, with caudal margins of fossae raised laterad in low, rounded ridges; meso-caudal area deeply concave, particularly cephalad, but in a less broadly transverse area; seventh segment as much produced, bilobate, with surfaces weakly convex except proximo-mesad, where twin, small, but very deep, fossae occur; eighth segment no more produced than fifth, transversely distinctly constricted, latero-caudal angles weakly acute-angulate produced, caudal margin weakly and evenly concave. Supra-anal plate strongly produced, subchitinous, with length distinctly greater than proximal width and free margin feebly and evenly convex to the parabolic apex. Sinistrad, within the anal chamber, are situated roundly angulate, chitinous processes, from which, mesad, projects a small, chitinous, flattened plate, tapering to aciculate apex which is directed dorsad. Dextrad, within the anal chamber, from a ventral, soft mantle, projects caudad an elongate, straight, chitinous, aciculate process with surface obliquely furrowed dorsad and externo-laterad; dextrad of this, an elongate, stout, straight, subchitinous process, with apex rounded, projects caudad. Above these processes, from a

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moderately large chitinous lobe with surface moderately convex, a chitinous, aciculate process is directed ventro-mesad. Subgenital plate strongly asymmetrical, subdeplanate, except laterad, where the lateral portions are rather narrowly reflexed; sinistral margin briefly lobate proximad, due to an acute-angulate emargination immediately dextrad of sinistral cercus, the margin decidedly thickened, straight and rather strongly oblique from base of this emargination to near mesal point of the plate; there supplied with a very small, rounded, decurved style, the dorsal surface of which is supplied with scant, chitinous, microscopic spines; close to this style on the distal margin is situated the dextral style, which is very minute, not half as large; remaining portion of free margin of plate gently convex. Limbs and armament of same as given in generic description.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Size appreciably larger, form less slender. Interocular space slightly wider. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, moderately triangularly produced, with apex blunt, lateral margins weakly concave. Subgenital plate large, not produced, surface decidedly convex, distal margin subsinuous, nearly transverse.

Measurements (in millimeters) of extremes of series

	Number of specimens[77]	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂	(28)	10.5–11.4	2.4–2.8	3.1–3.7	9.7–10.2	2.7–3.1
♀	(36)	11–12.8	3–3.3	3.8–4.2	10.8–11.9	3.2–3.3

Coloration.—General coloration ochraceous-buff to ochraceous-tawny. Head, from interocular space to inter-ocellar space, heavily washed with mars brown. Pronotum with paired, moderately heavy, longitudinal lines of deep mars brown, leaving a slightly broader longitudinal band mesad, which is sometimes washed with tawny. Rarely these bands are more decided (intensive), or very feebly indicated (recessive).

Immature examples of the species have the pronotal bands normally broader and continued on the mesonotum and metanotum, while the abdomen is heavily suffused with the darker coloration.

Ootheca.—In proportion to the size of the insect this is extremely large, 7 by 3.2 and 8 by 3.3 mm. in specimens before us; carried with suture laterad. Sutural and ventral margins weakly arcuate, width everywhere equal; distal margins straight, vertical. Sur-

[77] The body bulk shows more contrast between the sexes than this measurement would indicate, due to the fact that, in the male, the subgenital plate is strongly produced, while in the female it is decidedly truncate.

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face polished, shining, with vertical divisions of egg-sacs distinct. Suture very low, formed with short divisions, which from the side are seen to be convex, from above these are found to constitute narrow convex ridges on each side, nearly joining mesad, where each pair is connected with the next by a very brief, medio-longitudinal ridge.

This cosmopolitan species has established itself widely in human habitations almost everywhere in the United States. In Canada it has been recorded as far north as De Grassi Point on Lake Simcoe, Ontario; Goderich, Ontario; Winnipeg, Manitoba, and Strathcona, Alberta. Its greatest abundance on this continent appears to be reached in the central portion of the United States. According to Burr, it is known in Prussia as the Russian Roach, in Russia as the Prussian Roach. In New York it is usually called the Croton Bug.

Specimens Examined: 72; 32 males, 39 females and 1 immature individual.

Philadelphia, Pennsylvania, I, 27, 1916, (H. Winchester), 1 small juv., [Hebard Cln.]; 4 ♀, 1 with ootheca, [A. N. S. P.].

Harrisburg, Pa., VII, 7, 6 ♂, 4 ♀, [Pa. State Dept. Zool, Cln.].

Chestertown, Maryland, VIII, 12, 1903, (E. G. Vanatta), 1 ♂, 2 ♀, [A. N. S. P.].

Washington, District of Columbia, VIII, 1883, 1 ♀ with ootheca, [Hebard Cln.].

Hot Springs, Virginia, 2350 feet, VIII, 3, 1916, (Hebard; in larder, seen common in house at night), 1 ♀, [Hebard Cln.].

Raleigh, North Carolina, VI, 10 to IX, 13, 1904 and 1905, (Brimley and Bentley), 2 ♂, 2 ♀, [N. C. State Dept. Agr. Cln.].

Thomasville, Georgia, III, 24 to V, 11, 1903, (Hebard and for Hebard), 1 ♂, 1 ♀ with ootheca, [Hebard Cln.].

Miami, Florida, IX, 12, 1903, (for Hebard), 3 ♂, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; swarming in hotel cupboard), 4 ♀, [Hebard Cln. and A. N. S. P.].

Chattanooga, Tennessee, VI, 10, (G. G. Ainslie), 1 ♀, [U. S. N. M.].

Madison, Wisconsin, IV, 22 to X, 14, 4 ♂, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.]

St. Anthony Park, Minnesota, 1 ♀, [Hebard Cln.].

St. Louis, Missouri, X, 25, 1903, (C. L. Heink), 7 ♂, 3 ♀, [Hebard Cln.].

Mineola, Texas, VI, 27, 1911, (H. Pinkus), 1 ♂, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 1 ♂, 4 ♀, 1 with ootheca, [Hebard Cln.].

Fort Wingate, New Mexico, IX, 16, 1909, (J. Woodgate), 1 ♀, [Hebard Cln.].

Deming, N. M., VII, 20, 1907, (Rehn and Hebard; at light), 1 ♂, [Hebard Cln.].

Oregon, (Washburn), 1 ♂, 1 ♀, [Hebard Cln.].

Blue Cañon, Placer County, California, 4700 feet, VIII, 29, 1910, (Hebard), 1 ♂, [Hebard Cln.].

Eldridge, Cal., XI, 8 and 9, 1915, (J. A. Kusche), 3 ♂, 6 ♀, [Hebard Cln.].

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The Group Ischnopterites

The majority of the species of this group are less delicate in structure than those of the Blattellites. The tegmina have their discoidal sectors weakly radiating or simply longitudinal, not longitudinal and in part springing at a sharp angle from the ulnar vein near the apex of the anal field, or oblique to the discoidal vein. The wings have the ulnar vein with proximal rami incomplete and distal rami complete, reaching the distal margin. In the forms showing greatly atrophied tegmina and vestigial wings, or wholly lacking wings, such venational features have disappeared, and, in associating these with their proper group, the general facies and less distinctive or constant characters are the only recourse.

This is the second of the very large groups of the Pseudomopinae. Though the first of these, the Blattellites, is of even much greater size and has already been divided into far more genera, these two groups are similar in comprehending an unusual number of yet undescribed genera, in large part of tropical distribution, which include a multitude of species.

None of the numerous species assigned to *Ischnoptera* and found in Africa, Asia, Australia and Polynesia, probably belong to this genus in its restricted sense. Until large series are carefully studied, however, attempts to describe new genera for these, would only lead to such difficulties as were caused in the Blattellites by Shelford's hasty designation and description of a number of then similarly lumped, but evident, generic units.[78] This is likewise true of certain South American groups, which are represented by species which have been referred to *Ischnoptera*, but are distinct from that genus as correctly delimited.

The genera here considered which belong to the present group we list below in their proper sequence. All have been correctly referred to the subfamily Pseudomopinae.

		Genotype	Habitat of genotype
1838.	*Ischnoptera* Burmeister	*morio* Burmeister	Northern South America
1917.	*Parcoblatta* new name	*pensylvanica* (De Geer)	Eastern United States
1916.	*Symploce* Hebard	*capitata* (Saussure)	Cuba
1916.	*Xestoblatta* Hebard	*carrikeri* Hebard	Colombia

[78] See page 25.

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ISCHNOPTERA Burmeister

1838. *Ischnoptera* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 500.

The genus was based on four species, three at that time described, the fourth doubtfully included.

We have restricted the genus to the forms showing the features given below, which we are able to ascertain from a specimen of the type species before us; other species, which have been generally referred to *Ischnoptera*, but which do not agree in various characters here given, are properly referable to other distinct, though closely related genera.

GENOTYPE: *I[schnoptera] morio* Burmeister, selected by Kirby in 1904.[79]

Generic Description.—Head elongate; ocelli distinct, with flat surfaces of ocellar areas forming a rather sharp angle with the interocellar space.[80] Pronotum weakly convex, becoming strongly so narrowly laterad; disk in males with two distinct sulcations mesad which converge caudad, in females showing reduction in organs of flight these sulci are usually obsolete; lateral margins of pronotum fully as chitinous as the disk; caudal margin of pronotum very weakly and broadly convex.[81] Tegmina with discoidal sectors (these including the median and ulnar veins and their branches, of which the branches of the ulnar vein are the more numerous) weakly radiating so that the branches near the sutural margin are weakly oblique to that margin (Pl. II, fig. 10). Wings with area between discoidal vein and anterior margin narrow throughout; mediastine vein extending more than half the distance to the apex of the wing, from which spring a number of the costal veins; none of the costal veins enlarged distad; discoidal vein percurrent to apex of wing, undivided, with a number of distinct, well spaced, nearly perpendicular veinlets connecting with

[79] Synon. Cat. Orth., i, p. 80.

[80] In females showing greatly reduced tegmina, the head shows decidedly less specialization, and, as a result, the ocellar areas are very weakly defined and the ocelli represented by pale spots. This condition is not peculiar to the genus; throughout the Blattidae it is found coincident with very decided reduction in the organs of flight and an accompanying greater truncation of the caudal margin of the pronotum.

[81] The caudal margin of the pronotum becomes more truncate and more nearly transverse in material showing decided reduction in the organs of flight. See footnote 80.

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the median vein; ulnar vein weakly curved with a number (3 to 7) of proximal incomplete rami and a number (4 to 6) of moderately arcuate distal rami extending to the distal margin of the wing; intercalated triangle small and inconspicuous.[82] Males with median segment not specialized, but with sixth and seventh dorsal abdominal segments greatly specialized. Sixth segment emarginate mesad to near its proximal margin, with sides of emargination convex, bearing beneath on each side near the apex of the emargination a minute chitinous projection, armed dorsodistad with closely set delicate microscopic teeth which are directed cephalad (Pl. II, fig. 12); seventh dorsal abdominal segment in greater part lying under sixth segment, but with a narrow, mediolongitudinal, decidedly elevated ridge lying between the armed projections of the sixth segment. Eighth dorsal abdominal segment unspecialized. Cephalic femora with ventro-cephalic margin armed with (usually about four) heavy, elongate, well separated, proximal spines, succeeded distad by a row of minute, closely set, piliform spines, which is terminated distad by three heavy, elongate (in increasing ratio) spines. Other ventral margins of femora supplied with widely spaced, heavy, elongate spines. Tarsi elongate; a single, small, rounded pulvillus present distad on each of the four proximal tarsal joints. Small arolia present.

The Vilis Group of the Genus *Ischnoptera*

This group includes probably the only native North American[83] species of the genus *Ischnoptera*. It precedes and is separated from the Morio and Rufa Groups by features of the male supra-anal plate, which is of generally similar trapeziform shape but chitinous throughout, while the females of the two species known to us, *vilis* and *deropeltiformis*, both have greatly reduced tegmina. The general coloration in these two species is very dark, the pronotal sulci in the males is pronounced, the male subgenital plate is of the general type found in the Morio and Rufa Groups.

[82] In females of the Morio Group these features are absent, due to great reduction in the organs of flight.

[83] We here use North America in the restricted sense, taking the continent north of the Mexican boundary as covered in the present paper.

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Ischnoptera deropeltiformis (Brunner) .(Plate II, figs. 10 to 15.)

1865. *T[emnopteryx] deropeltiformis* Brunner, Nouv. Syst. Blatt., p. 87. [♂, ♀, North America.]

1868. *Ischnoptera nigricollis* Walker, Cat. Blatt. Br. Mus., p. 118. [♂, Georgia.]

1903. *Ischnoptera johnsoni* Rehn, Ent. News, xiv, p. 234. [♂, St. Augustine, Florida.]

1903. *Ischnoptera intricata* Blatchley, Orth. of Indiana, p. 186. (In part.) [♂, Crawford County, Indiana.]

The extensive series now before us establishes beyond question the above synonymy. Both *nigricollis* and *johnsoni* were based on males of a rather small condition having unusually pale tegmina, which we find occurs only from southern Georgia to south-central peninsular Florida. The constancy of these differences over that area would suggest the presence of a geographic race, but even there rare exceptions occur and other series before us show that the size variation is decided, sometimes apparently due to geographic and sometimes evidently to individual variation, while occasional specimens are found having the tegmina paler than normal. This variant, occurring as the usual development over certain areas, is in many ways comparable with the black variant found in the grasshopper, *Romalea microptera*.[84] Such differentiation is almost certainly due to a response to conditions of local environment and probably is in no way a fixed hereditary feature, the differences in environment at certain localities bringing about such differences to varying degrees in a series from the same locality. We are strongly opposed to nominal designation of such chromatomorphs, but, if that course was pursued, a name of higher significance than "variety" or "color variant" could not be assigned without absolute error.

Unfortunately Rehn and Hebard described as the female of *johnsoni*, that sex of *Parcoblatta uhleriana*,[85] and in consequence placed *intricata*[86] of Blatchley incorrectly under *johnsoni*.

[84] See Rehn and Hebard, Proc. Acad., Nat. Sci. Phila., 1916, p. 194, (1916).

[85] All records of females of *I. johnsoni* in the literature are properly referable to *P. uhleriana*.

[86] This name was also primarily based on females of *P. uhleriana*.

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When compared with the species of apparently nearest relationship, *I. vilis*,[87] the present insect is found to differ as follows: ♂ Lateral lobes of pronotum concolorous with disk, in *vilis* usually weakly, sometimes strongly, defined in a paler color; wings with mesal marginal area of costal veins often paler than the surrounding portions, in *vilis* darker; incomplete rami of ulnar vein normally oblique; supra-anal plate distinctly more produced; meso-distal production of subgenital plate more decided; styles of the general type found in *I. morio* and *I. rufa*, with dextral style distinctly the larger and armed on dorsal surface at apex only, in *vilis* the dextral style is very slightly the stouter, gradually tapering, with dorsal surface, from near the base, supplied with minute, chitinous spines; limbs normally unicolorous, in *vilis* the tibiae and tarsi are normally much paler than the other portions.

♀ Interocular space narrower and very dark; tegmina subquadrate with sutural margins attingent, in *vilis* lateral, broadly lanceolate, with sutural margins oblique to narrow, rounded apices.

The following features are of importance in distinguishing the species.

Male. (Plummer's Island, Maryland.) Size medium large, form moderately slender for the group. Interocular space slightly greater than interocellar space. Ocelli large, with flat surfaces rather sharply oblique to interocellar area, as in *morio*. Maxillary palpi rather short, fifth (distal) joint longer than third, fourth slightly shorter than third joint. Tegmina with point of greatest width meso-distad; discoidal sectors slightly radiating, those toward the sutural margin being distinctly oblique to that margin. Dorsal surface of abdomen with sixth and seventh segments alone specialized, showing the remarkable condition typical for the species of the genus.[88] Supra-anal plate margined proximad by concave distal margin of preceding segment, its surface there broken by a weak, but distinct, transverse suture; free margin straight and oblique laterad to mesal third which is transverse, the angles thus formed blunt. In the anal orifice, beneath the base of each cercus, a heavily chitinous arm is directed mesad, both tapering to their acute apices, the sinistral considerably the longer and, toward the apex, curved dorso-cephalad.

[87] 1869. *Ischnoptera vilis* Saussure, Rev. et Mag. Zool., Sér. 2, xxi, p. 112. [[♂], Argentine Republic.]

The above comparisons are made from the following material before us of this species.

Sapucay, Paraguay, X to III, 2, 1902 to 1904, (W. T. Foster), 11♂, [Hebard Cln. and A. N. S. P.].

Misiones, Argentina, XII, 12, 1910 and I, 1911, (P. Jorgensen), 2♂, [A. N. S. P.].

La Cumbre, Cordoba, Argentina, (C. Lizer), 1♂, 1♀, [A. N. S. P.].

[88] See generic description and pl. II, fig. 12.

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Beneath these a number of chitinous plates and smaller projections occur in the anal orifice, dextrad among which is found the process which we term the genital hook in the species of *Parcoblatta*, here sharply recurved, much paler in color than the other chitinous processes, with recurved portion elongate, expanding slightly distad throughout, with a ventral, oblique cleft just before the rounded, hooded apex, giving the recurved portion a fanciful resemblance to a pitcher-plant. Subgenital plate convex, but with surface weakly concave at dextral portion of free margin and at sinistro-mesal distal portion; free margin dextrad rather decidedly convex to mesal point, there an irregularly rounded, sinistro-mesal production occupies half of the remaining distance to the sinistral cercus, the dextral margin of this production forming, at its base, a rectangle with the dextral portion of the free margin, remaining sinistral portion of free margin nearly straight, oblique, from base of production to base of cercus. Dextral style situated mesad on production at its apex, of same character as in *rufa;* sinistral style also as in that species, situated near sinistral base of production. Limbs and armament of same normal for the genus.

Female. (Washington, District of Columbia.) Agrees with male except in the following features. Size larger, form decidedly more robust. Eyes separated by a decidedly greater space, slightly greater than that between the small ocellar spots, which are situated in an area rounding gently into the plane of the interocellar space. Pronotum without discal sulci. Tegmina subquadrate, with sutural margins attingent, costal margin very weakly convex, rounding rather sharply into the very weakly oblique, nearly transverse, distal margin, which shows a weak concavity toward the apex of the anal vein, sutural margin similar to costal margin. Wings small atrophied pads, their apices extending nearly to the distal margins of the tegmina. Dorsal surface of abdomen unspecialized. Supra-anal plate not strongly triangularly produced, with lateral margins very weakly concave, nearly straight, and apex rather sharply rounded. Cerci slightly shorter and stouter than in male. Subgenital plate convex, hardly produced, with free margin very broadly and regularly convex.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Westville, New Jersey.....	15	3.8	5.1	16.8	5.2
Plummer's Island, Maryland..	16	3.8	5.1	17.2	5.3
Tryon, North Carolina.....	15.6	4	5.4	18.3	5.6
Raleigh, North Carolina.....	13.2	3.3	4.7	14.2	4.3
Raleigh, North Carolina.....	14.7	3.8	4.9	15.6	4.9
Clayton, Georgia.....	15.5	4	5.1	17.7	5.2
St. Simon's Island, Georgia...	11.7	3.3	4.3	13.3	4
Enterprise, Florida.....	13	3.7	4.6	14.1	4.3
Homestead, Florida.....	12.3	3.2	4.5	13.2	4.2
Homestead, Florida.....	13.3	4	5.1	15.8	4.7
Crawford County, Indiana....	13.7	4	5.3	18	5.3

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♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Mountain Grove, Missouri....	17	4.4	5.3	19.6	6
Waco, Texas.....	16.5	3.8	5	16.8	5.1
♀					
Reega, New Jersey.....	14.5	4.2	5.3	4.8	3.9
Reega, New Jersey.....	16	4.7	6.2	5.3	4.6
Washington, District of Columbia.....	15.5	4.7	6	4.9	4.1
Raleigh, North Carolina.....	13.3	4	5.2	3.8	3.4
Raleigh, North Carolina.....	16	4.6	6	5.2	4.3
Hebardville, Georgia.....	15.5	4.7	5.9	5.3	4.2
Jacksonville, Florida.....	11.4	4	4.9	4.3	3.4
Homestead, Florida.....	14.2	4.5	5.7	4.7	4
Homestead, Florida.....	14.7	5	6.9	5.2	4.2
Chokoloskee, Florida.....	17.8	5.2	7	5.3	4.7
Crawford County, Indiana....	15.8	4.7	6.4	5.1	4.3
Ottawa, Kansas.....	16	5	6.8	5.7	4.7
Mountain Grove, Missouri....	17	5.2	7.3	6.9	4.8

The considerable size variation shown appears to us to be due, in large part, to local environmental conditions rather than to geographic influences. It is evident, however, that the largest size development occurs toward the centers of maximum development of the vegetation of the Upper Austral Zone, and again in Tropical Florida.

Coloration.[89]—♂. General color of entire insect, except wings and limbs, shining blackish brown, on the tegmina becoming distad slightly paler, chestnut brown, and translucent. Ocelli and clypeus pale buff. Limbs and spines ochraceous-orange. Tegmina and wings often inconspicuously margined, in area of costal veins, with buffy. Wings transparent, washed with chestnut brown, this more decided in proximal portion of costal veins and distal area of anterior field, veins translucent chestnut brown. Only in the series from Crawford County, Indiana, are the trochanters and femora shining chestnut brown, strikingly darker than the tibiae and tarsi.[90]

[89] As we have noted in other species of Blattidae, individuals of this species are very pale in color after moulting, becoming darker very gradually and only attaining their full coloration when the chitin has fully hardened. Such specimens are sometimes difficult to determine. See footnotes 92 and 93.

[90] As originally described by Brunner, but clearly not the normal condition over the greater portion of the species' distribution.

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♀. General color shining black, with a brownish tinge very weakly indicated. Ocellar spots pale buff. Clypeus and limbs kaiser brown.

Very rarely specimens are slightly paler in general coloration, but occasional individuals show the tegmina alone slightly paler than normal (1 ♂, Westville, N. J.; 1 ♂, 3 ♀, Raleigh, N. C.; 1 ♂, Asheville, N. C.; 1 ♂, Keokuk, Iowa; 1 ♂, Mountain Grove, Mo.), while the majority of specimens from southern Georgia and Florida, south as far as Lake Okeechobee (normal, from this region: 1 ♂, St. Simon's Island, Ga.; 1 ♀, Hebardville, Ga.), have the tegmina alone decidedly paler than normal, deep chestnut brown proximad shading rapidly to sudan brown, the entire tegmina having a purplish iridescence. The decidedly different appearance of this color variation has led to the synonymy discussed above.

In the present species the ootheca is carried with suture dorsad. The suture forms a conspicuous ridge with vertically fluted sides. The surface of the ootheca is apparently smooth, under a moderate magnification feebly shagreenous, with very faint traces of vertical division.

The species is known over the entire eastern United States as far north as West Creek and Westville, New Jersey; Enola, Pennsylvania; Marshall County, Indiana; west as far as Ottawa, Kansas, and Dallas, Kerrville and Victoria, Texas.

Specimens Examined:[91] 194; 91 males, 58 females and 45 immature individuals.

West Creek, New Jersey, VIII, 28, 1914, (Rehn; trapped in molasses jar in tangle of briars), 1 ♀, [A. N. S. P.].

Reega, Atlantic County, N. J., VII, 31 to VIII, 20, 1914, (Hebard; trapped in molasses jar in pine barrens), 9 ♀, 3 juv. ♀, [Hebard Cln.].

Swainton, N. J., VIII, 21, 1914, (Hebard; trapped in molasses jar in pine barrens), 1 juv. ♂, [Hebard Cln.].

Westville, N. J., VI, 6, 1 ♂, [Hebard Cln.].

Wayne, Delaware County, Pennsylvania, IV, 25, 1 juv. ♀, [Pa. State Dept. Zool.].

Enola, Pa., V, 11, 1907, 1 juv. ♂, [Pa. State Dept. Zool.].

Cumberland Valley, Pa., VIII, 1871, (Shaler), 1 juv. ♂, [M. C. Z.].

[91] All material previously recorded as *I. nigricollis* and all males as *I. johnsoni*, are correctly referable to the present species.

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Washington, District of Columbia, VI, 1910, (W. T. Davis), 7 ♂, 6 ♀, [Davis Cln.]; VI, 2, 1901, 1 ♀, [U. S. N. M.]; 1 ♀, [Hebard Cln.].

Glen Echo, Maryland, VII, 10, 1914, (Hebard; under stone in heavy deciduous forest), 1 small juv. ♀, [Hebard Cln.].

Cabin John Run, Md., III, 21 and IX, 1911, (Knab; Davis), 3 juv. ♀, [U. S. N. M. and Davis Cln.].

Plummer's Island, Md., V, 24, 1914, (J. D. Hood), 2 ♂, [U. S. N. M. and Hebard Cln.]; VI, 18, 1908, (H. S. Barber), 2 ♂, [U. S. N. M.].

Virginia, near Washington, D. C., III, 25, 1883, 1 juv. ♂; V, 30 and VI, 7, 1883, 1 ♂, 1 ♀, [all Hebard Cln.].

Alexandria County, Virginia, IX, 1911, (W. T. Davis), 2 juv. ♀, [Hebard Cln.].

Great Falls, Va., VI, 1909 and 1910, (Knab; Davis), 3 ♂, 1 ♀, [U. S. N. M. and Davis Cln.].

Falls Church, Va., juv. taken IX, 29, 1903, (A. N. Caudell; bred, adult III, 7, 1904, died about IV, 28), 1 ♂, [U. S. N. M.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard; under damp dead leaves on edge of forest), 1 ♂, [Hebard Cln.].

Tappahannock, Va., VI, 12, 1916, VI, 17, 1915, (H. Fox), 2 ♂, [Hebard Cln.].

Charlottesville, Va., VI, 15, 1914, (H. Fox), 1 ♂, [Fox Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; in forest, ♂ under stone, ♀ in dead leaves), 1 ♂, 1 ♀, [Hebard Cln.].

Appomattox Court House, Va., IV, 6, 1865, 1 juv. ♂, [M. C. Z.].

Montgomery County, Va., VI, 1, 1901, (E. A. Smyth Jr.), 1 ♂, [Hebard Cln.].

Raleigh, North Carolina, V, 24 to VII, 1, 1904 and 1905, (C. S. Brimley; many bred), 4 ♂, 11 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Southern Pines, N. C., VI, 3 to VII, 31, 1915, (A. H. Manee), 2 ♂, 4 ♀; X, 14, 1915, (A. H. Manee), 1 juv. ♂, [all Hebard Cln.].

Sulphur Springs, Buncombe County, N. C., VI, 13, 1904 and IX, 23, 1905, (Hebard), 1 juv. ♂, 1 juv. ♀; V, 8 and 10, 1904, (Hebard), 2 ♂, [all Hebard Cln.].

Tryon, N. C., V, 20, (W. F. Fiske), 1 ♂, [U. S. N. M.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard), 1 juv. ♂, [Hebard Cln.].

Clayton, Georgia, 2000 feet, V, 18 to 26, 1911, (J. C. Bradley), 1 ♂, [Hebard Cln.].

Thompson's Mills, Ga., spring of 1909, (H. A. Allard), 1 juv. ♂, [U. S. N. M.].

Macon, Ga., VII, 30, 1913, (Rehn and Hebard; under oak leaves on edge of oak and short-leaf pine woods), 1 ♀, [Hebard Cln.].

Warm Springs, Ga., VIII, 9, 1913, (Rehn; running on ground), 1 ♀, [A. N. S. P.].

St. Simon's Island, Ga., VI, 8, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.].

Hebardville, Ga., V, 15, 1915, (Hebard; under rubbish in garden), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (T. J. Priddey), 2 ♂, 1 ♀, [Hebard Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♂, *type* of *I. johnsoni*, [A. N. S. P.].

Ormond, Fla., III, 23, 1899, (W. S. Blatchley), 1 ♂[22], [Blatchley Cln.].

[22] This is a specimen which, killed when recently moulted, had not attained its full coloration. It was incorrectly recorded by Blatchley as *bolliana*.

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River Junction, Fla., VIII, 31, 1915, (Hebard; under bark of pine log), 1 very small juv., [Hebard Cln.].

De Funiak Springs, Fla., IV, 7, (H. G. Hubbard), 1 ♂, [U. S. N. M.]; VIII, 30, 1915, (Hebard; in wire grass and sphagnum bordering stream thicket), 1 very small juv., [A. N. S. P.].

Cedar Keys, Fla., VI, 7, 1 ♂, [U. S. N. M.].

Enterprise, Fla., IV, 20 to V, 24, 4 ♂, [M. C. Z., U. S. N. M. and Hebard Cln.].

Sanford, Fla., (S. B. Frazer), 8 ♂, [M. C. Z.].

Lakeland, Fla., V, 7, 1912, (W. T. Davis), 1 ♀, [A. N. S. P.].

Lake Okeechobee, Fla., (E. Palmer), 3 ♂, 2 ♀, [M. C. Z.].

Fort Capron (present town of Viking), Fla., IV, 22, 1 ♀, [M. C. Z.].

Miami, Fla., II, 28, 1916, (Hebard; in leaf mould in Brickell's Hammock, bred adult V, 8, 1916), 1 ♂; III, 4 to 15, 1915, (Hebard; trapped in molasses jar in Brickell's Hammock), 1 juv. ♂, 1 juv. ♀; VIII, 15, 1903, (for Hebard), 1 ♀, [all Hebard Cln.].

Homestead, Fla., III, 17 to 19, 1910, (Hebard; rubbish about pot-hole in pine woods, *Pinus caraibea*), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀; VII, 10 to 12, 1912, (Hebard; under board on everglades), 1 ♂, 2 ♀, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Detroit, Fla., VII, 12, 1912, (Rehn and Hebard; debris and leaf mould in hammock), 1 ♀, [A. N. S. P.].

Chokoloskee, Fla., IV, 8, 1912, (W. T. Davis), 1 ♀, [Hebard Cln.].

Everglade, Fla., IV, 1912, (W. T. Davis; trapped in sugar jar), 1 ♂, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; debris and leaf mould in hammock), 1 ♂, 1 ♀, [Hebard Cln.].

Crawford County, Indiana, V, 9, 1894, (W. S. Blatchley), 1 ♂,[88] [Blatchley Cln.]; V, 25 to VI, 30, 1902 to 1904, (W. S. Blatchley), 4 ♂, 2 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Pyriton, Clay County, Alabama, (H. H. Smith), 1 ♂, [U. S. N. M.].

St. Louis, Missouri, III, 27 to VI, 1904, (C. L. Heink), 1 juv. ♂, 3 juv. ♀, [Hebard Cln.].

Mountain Grove, Mo., IV, 1 to 21, 1914, (M. P. Somes), 4 juv. ♂, 1 juv. ♀; V, 26, 1916, (M. P. Somes; trapped, molasses jar), 1 ♂, 2 ♀; V, 16 to VI, 11, 1914 and 1915, (M. P. Somes), 6 ♂, 2 ♀; VIII, 14, 1916, (for Somes; trapped molasses jar), 2 ♀, [all Somes Cln.].

Arcadia, Louisiana, VIII, 20, 1915, (Hebard; dead oak leaves in heavy deciduous forest), 1 juv. ♂, [Hebard Cln.].

New Orleans, La., (Shufeldt), 1 juv. ♀, [U. S. N. M.].

Moscow, Iowa, V, 30, 1908, (M. P. Somes), 1 juv. ♀, [Somes Cln.].

Iowa City, Ia., VI, 12, 1915, (M. P. Somes), 1 ♀, [Hebard Cln.].

Keokuk, Ia., VI, 17, 1915, (M. P. Somes), 1 ♂, [Somes Cln.].

[88] This specimen Blatchley, with some doubt, described as the male of his *intricata*. This was partially due to the fact that, killed when recently moulted, it had not attained its full coloration.

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Ottawa, Kansas, VI, 7, 1 ♀, [Univ. Kansas Cln.].
Paris, Texas, V, 20, 1904, (at light), 1 ♂, [U. S. N. M.].
Dallas, Tex., (J. Boll), 2 ♂, [M. C. Z.].
Waco, Tex., V, 11 to VI, 5, (Belfrage), 9 ♂, [M. C. Z. and Univ. Kansas Cln.].
Tiger Mills, Tex., II, 1885, (F. G. Schaupp), 1 juv. ♂, [Hebard Cln.].
Boerne, Tex., (in stomach of armadillo, *Tatu novemcinctum*), 1 juv. ♀, [U. S. N. M.].
Kerrville, Tex., VI, 6, 1906, (F. C. Pratt), 1 ♂, [U. S. N. M.].
Hockley, Tex., VI, 16, 1891, (F. W. Thouron), 2 ♂, 1 juv. ♂, [U. S. N. M.].
Victoria, Tex., IV, 5, 1907, (J. D. Mitchell), 1 ♂, [U. S. N. M.].

PARCOBLATTA[94] new name

1862. *Platamodes*[95] Scudder, Bost. Jour. Nat. Hist., vii, p. 417.

This genus was placed by Brunner in the synonymy under *Ischnoptera* in 1864[96]; which action has been generally followed by subsequent authors. Since that time no effort has been made until recently[97] to separate the genera of the Ischnopterites, all the species being referred without exception to *Ischnoptera*. Careful study of the very large series of this group before us shows this attitude to be untenable, and that numerous distinct genera have been included under *Ischnoptera*. One of these, to which belong the species assigned to *Platamodes* by Scudder, is amply distinct from *Ischnoptera* sensu strictiore, as may be seen by the characters given below.[98] To *Parcoblatta* belong all of the species of the Ischnopterites found native in the United States, excepting *Ischnoptera deropeltiformis* (Brunner) and *Symploce lita* Hebard. No purely exotic species of the genus are known to exist.

When compared with the species of *Ischnoptera*, those of the present genus are found to be separated by the different type of

[94] From *parca*=frugal. In allusion to the frugal habits of these insects. Living immature examples before us have been extremely active for months at night, a few bread crumbs and water apparently affording ample food.

[95] Preoccupied by *Platamodes* Menetries, (Coleoptera), described in 1849.

[96] Nouv. Syst. Blatt., p. 128.

[97] 1916. Hebard. "Studies in the Group Ischnopterites." Trans. Am. Ent. Soc., xlii, pp. 337–383.

[98] The original description is a useless comparison with *Periplaneta*, except that the male styles are described as being very short and turned abruptly downward.

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pronotum in the males, and in females which have fully developed tegmina and wings,[99] the very different specialization of the male dorsal abdominal segments[100] and the unspecialized deflexed styles of the male subgenital plate. A much larger proportion of the species also have the females showing very decided reduction in the tegmina and wings.

Scudder's genus *Platamodes* was based on two species, the first and oldest of which we designate as genotype.

GENOTYPE here selected: *Parcoblatta pensylvanica* [*Blatta pensylvanica*] (De Geer).

Generic Description.—Pronotum weakly convex, becoming strongly so narrowly laterad; disk very weakly impressed, with oblique sulci very decided to subobsolete; caudal margin of pronotum convex.[101] In females with much reduced tegmina and wings the pronotum is more evenly and decidedly convex, the discal sulci obsolete and the caudal margin decidedly truncate.[102] Tegmina, as in *Ischnoptera*, with discoidal sectors (these including median and ulnar veins and their branches, of which the branches of the ulnar vein are the more numerous) weakly radiating, so that the branches near the sutural margin are weakly oblique to that margin. Wings with area between the discoidal vein and anterior margin broadest meso-distad, proportionately wider than in *Ischnoptera;* mediastine vein not extending half the distance to the apex of the wing, and from it spring very few of the costal veins; none of the costal veins enlarged distad; discoidal vein percurrent

[99] As in the majority of species of the Blattidae, in which the sexes show decided differences in the development of the organs of flight, the greatest reduction occurs in the female sex. Accompanying this, a pronotal modification is almost always found, the surface becoming more evenly and strongly convex and the caudal margin decidedly more truncate. Thus the usual condition gives us the anomaly of the most differentiated type (the female) being much the simplest in general structure; this being true, not only for pronotum, tegmina and wings, but also for the head, abdominal segments and genitalia.

[100] In *bolliana* and *desertae* alone, no specialization occurs in the male median and dorsal abdominal segments, the general facies and other features serving to place them without question in the present genus.

[101] The pronotum and tegmina, these latter chiefly proximad, are supplied with scattered hairs in specimens having fully developed organs of flight. In males of *zebra* these are very numerous, but in males of *bolliana* the greatest abundance is found.

[102] See footnote 99, and Hebard, Trans. Am. Ent. Soc., xlii, p. 166, footnote 23, (1916).

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to apex of wing, without rami and with perpendicular veinlets connecting with median vein weakly defined or obsolete; ulnar vein weakly curved, with one to six proximal incomplete rami and four to eight complete rami;[103] no intercalated triangle present.[104] Males with median and first dorsal abdominal segments specialized, but without any distinct modification of the remaining segments, or with median segment alone specialized, or with all segments unspecialized.[105] Styles of male subgenital plate represented by slender, deflexed, similar, cylindrical processes with rounded apices, the dextral slightly the longer, both entirely unarmed. Armament of limbs of same character as that of *Ischnoptera*. Cephalic femora with ventro-cephalic margin armed with (usually three to six) heavy, elongate, well separated, proximal spines, succeeded by a row of minute, closely set, piliform spines, which is terminated distad by three heavy, elongate (in increasing ratio) spines. Other ventral margins of femora supplied with widely separated, heavy, elongate spines. A single small rounded pulvillus present distad on each of the four proximal tarsal joints. Small arolia present.

The species of the present genus all have a general facies which differs from that of the species of either *Ischnoptera* or the more widely separated genus *Symploce*. In all but one species, *P. caudelli*, the females show, to different degrees, notable reduction in the organs of flight. It is clear that the degree or character of such reduction is valueless in determining the relationship of the various species; for in many cases, species showing distinctive characters which must be considered evidences of close affinity, have, in the female sex, wide differences in the alar features. Such reduction, however, probably affords the best means of determining the relative antiquity of the various species, their common

[103] Very rarely an abnormal individual of the present genus is found having no incomplete rami of the ulnar vein. Though the venation is extremely useful in determining the generic position of material of the group in the large majority of cases, we must bear in mind that variation is more liable to occur than in the more important features such as sexual specialization or character of limb armament.

[104] The tegminal and wing features naturally can not be observed in females of species in which the reduction of these organs is decided.

[105] The remarkable character of the specialization of the fifth and sixth dorsal abdominal segments in males of *Ischnoptera* is found in all the species of that genus.

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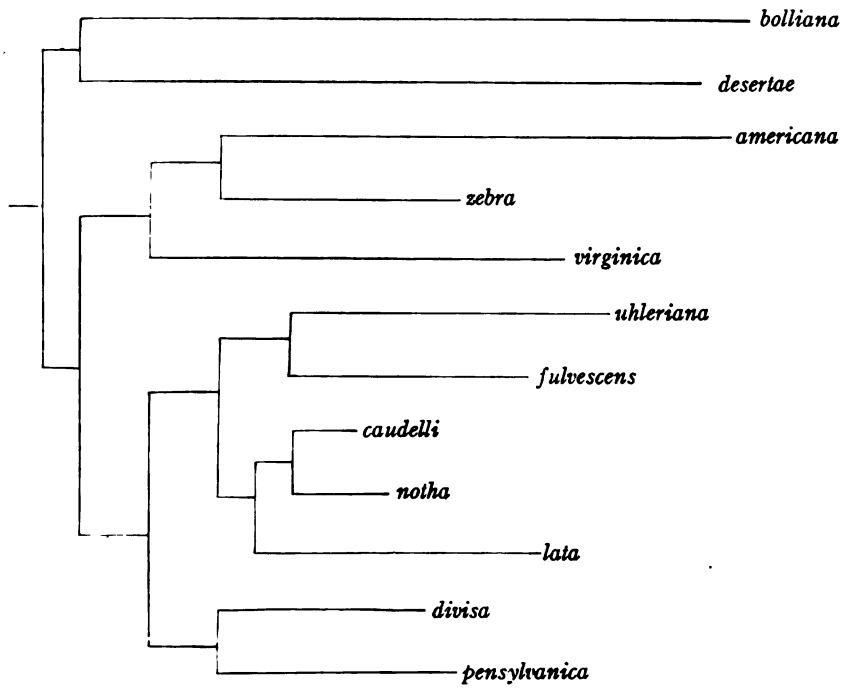
ancestor probably having been an insect with fully developed organs of flight in both sexes.[106] The species are each distinctive to a degree in some feature; so striking is this that logical division of the genus into groups is out of the question.

The following diagram best indicates the relationship and proper position of the species.



As indicated above, greatest probable divergence from the common ancestor is shown by the female tegminal reduction in *bolliana* and *americana*, least differentiation in this respect in *caudelli*. The character of the median and first dorsal abdominal segments in the male, we believe, affords the best guide to determine the specific relationships. It is of further interest to note that the general character of the male supra-anal plate is the same in *bolliana*, *desertae* and *virginica;* in *americana* and *notha;* in *zebra*, *uhleriana*[107], *fulvescens*, *caudelli* and *lata*, and in *divisa* and *pensylvanica*.

[106] See page 10.

[107] In this species, showing a certain degree of divergence toward the type found in *americana* and *notha*.

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Other particularly distinctive features are: the proportionately somewhat broader tegmina in males of *virginica* and *uhleriana;* the specialization of the cercal joints in males of *uhleriana* and remarkably distinctive ootheca of that species; the production of the dorsal surface of the male subgenital plate at the base of the dextral style in *fulvescens*, and the less radiating, nearly longitudinal, discoidal sectors in the male tegmina of *zebra*. The last feature given for *fulvescens* is somewhat variable and to a certain degree geographic in character. Such is also true of an unusual cephalic flattening of the head found in *divisa* and specialization of the cercal joints in both sexes of *pensylvanica*.[108]

Key to Males

(*Primarily based on the Specialization of the Median and First Abdominal Segments*)

A. Dorsal surface of abdomen unspecialized.
  B. Interocular space no wider than that between ocelli. Head dark colored. Sulci of pronotal disk very decided..... **bolliana** (Saussure and Zehntner)
  BB. Interocular space much wider than that between ocelli. Head pale. Sulci of pronotal disk moderately decided..... **desertae** (Rehn and Hebard)
AA. Dorsal surface of abdomen specialized.
  B. Median segment alone specialized.
    C. Median segment with a single specialized area.
      D. Specialized area represented by a moderately large, mesal portion supplied with minute, scattered hairs..... **virginica** (Brunner)
      DD. Specialized area represented by a tuft of agglutinated hairs.
        E. This tuft small and quadrate, remaining portion of segment showing little specialization..... **americana** (Scudder)
        EE. This tuft larger and much broader, remaining portion of segment showing further specialization..... **zebra** new species
    CC. Median segment with twin specialized areas.
      D. These specialized areas represented by weakly raised mesal ridges, with brief cephalic faces supplied with a heavy tuft of hairs.
        E. Pronotum proportionately shorter, with point of greatest width mesad. Tegmina much broader than pronotum. Cerci with inner distal angles of sixth to ninth joints acutely but briefly produced. Subgenital plate at base of dextral style not elevated..... **uhleriana** (Saussure)

[108] The instability of these features prevents nominal recognition, though it probably indicates the incipient stages of geographic racial development.

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EE. Pronotum proportionately longer, with greatest width slightly caudad of mesal point. Tegmina little broader than pronotum. Cerci simple. Subgenital plate at base of dextral style decidedly elevated.[109]
fulvescens (Saussure and Zehntner)

DD. These specialized areas represented by decided mesal ridges, overhanging the segment which is concave cephalad, ventral faces of overhanging extremities heavily supplied with short hairs.
divisa (Saussure and Zehntner)

BB. Median and first dorsal abdominal segments similarly specialized, (each with twin specialized areas).

C. These specialized areas represented on each segment by moderately decided, to weak, elevations, with brief cephalic faces supplied with a heavy tuft of hairs.

D. These elevations moderately decided. Supra-anal plate with a transverse mesal production, which is strongly deflexed. (Size rather large. Form slender. Pronotum proportionately unusually long; length 3.8 to 4.3, width 4.8 to 5.3 mm.).....**notha** (Rehn and Hebard)

DD. These elevations weak. Supra-anal plate triangularly produced with apex rounded and distal portion not suddenly deflexed.

E. Size medium. Form moderately slender. Pronotum; length 2.9 to 3.4, width 3.9 to 4.7 mm.....**caudelli** new species

EE. Size large. Form robust. Pronotum; length 4.2 to 5.2, width 5.4 to 6.7 mm.....**lata** (Brunner)

CC. These specialized areas represented on each segment by very decided elevations, overhanging the segments which are concave cephalad, ventral faces of overhanging extremities heavily supplied with hairs.
pensylvanica (DeGeer)

Key to Females

(*Primarily based on Tegminal and Wing Characters*)

A. Wings absent. (Tegmina very greatly reduced, represented by very small, lobiform, lateral pads.)

B. Form compact. Interocular space subequal to that between antennal sockets. Tegmina showing hardly any traces of venation. Supra-anal plate rather weakly produced, with lateral margins convergent to broadly rounded apex.....**bolliana** (Saussure and Zehntner)

BB. Form normal, not as compact. Interocular space appreciably wider than that between antennal sockets. Tegmina with apparent venation. Supra-anal plate normally produced, with lateral margins convergent to rather sharply rounded apex.....**americana** (Scudder)

AA. Wings present.

B. Tegmina decidedly, to greatly, reduced.

[109] This development is found to be normally very weakly indicated in material from the southwestern portion of the species' distribution.

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C. Tegmina represented by subtriangular, lateral pads. Wings vestigial.
D. Tegmina elongate, subtriangular, lateral pads. General coloration very pale. Supra-anal plate with lateral margins at bases of cerci showing a very broad and weak triangular production..**desertae** (Rehn and Hebard)
DD. Tegmina roundly subtriangular, lateral pads. General coloration ferruginous to very dark. Supra-anal plate with lateral margins convergent and weakly concave.....**uhleriana** (Saussure)
CC. Tegmina represented by subquadrate, slightly overlapping pads. Wings greatly reduced.
D. Tegmina truncate distad, this commencing at apex of anal field.
E. Size rather small, form relatively slender. Pronotum; length 3.2 to 3.8, width 4 to 4.9 mm. General coloration normally more hazel. Margin of sixth dorsal abdominal segment weakly convex mesad. Supra-anal plate with lateral margins normally straight and convergent to sharply rounded apex.....**virginica** (Brunner)
EE. Size medium, form broad. Pronotum; length 3.1 to 4.9, width 4.6 to 6.6 mm. General coloration normally kaiser brown and blackish brown. Margin of sixth dorsal abdominal segment distinctly convex mesad. Supra-anal plate with lateral margins normally convergent and rather feebly concave to rather bluntly rounded apex.
fulvescens (Saussure and Zehntner)
DD. Tegmina truncate distad, this commencing beyond apex of anal field. (Size very large, form very robust. Pronotum; length 4.8 to 6.1, width 6.8 to 8.2 mm. General coloration kaiser brown, hays russet and blackish brown. Sixth dorsal abdominal segment and supra-anal plate as in *fulvescens*.....**lata** (Brunner)
BB. Tegmina only moderately reduced, neither lateral or truncate distad.
C. Tegmina with apices not reaching beyond apex of supra-anal plate. Sustained flight impossible.
D. General color ochraceous-tawny.....**notha** (Rehn and Hebard)
DD. General coloration dark brown with various paler markings.
E. Dorsal surface of abdomen buffy, heavily banded with brown.
zebra new species
EE. Dorsal surface of abdomen not banded.
F. Size normally smaller. Pronotum; length 3.7 to 4.9, width 4.7 to 6.6 mm. Coloration normally less solid, with lateral margins of pronotum less strikingly pale.[110].....**divisa** (Saussure and Zehntner)
FF. Size normally larger. Pronotum; length 4.3 to 5.8, width 5.1 to 7.2 mm. Coloration normally more solid, with lateral margins of pronotum more strikingly pale.....**pensylvanica** (DeGeer)
CC. Tegmina with apices reaching beyond apex of supra-anal plate. Sustained flight possible. (General color ochraceous-tawny.)....**caudelli** new species

[110] Head decidedly more flattened in material from the southwestern portion of the species' distribution.

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Though this key may be useful in determining the majority of specimens encountered, variation in all the features known for the separation of females constantly occurs. Use of a key, without reference to the known specific variability and unusual features, can only lead to occasional serious mistakes. This is particularly true in such species as *divisa* and *pensylvanica*, where sufficient variation occurs in each, toward the other, to make determination of occasional specimens extremely difficult, even when the specific range of variation in all features is carefully considered.

The genus is distributed generally over the United States, being absent apparently only in the Cordilleran region from Colorado northward and in almost the entire area of the Great Basin. Few species reach beyond the Canadian boundary, and these only in the East. The most northern records for the genus are Orono, Maine; Abbotsford and Montreal, Quebec; Sudbury, Ontario; Polk County, Wisconsin; eastern Nebraska; Fort Davis, Texas; Prescott, Arizona; Verdi, Nevada, and Oregon. Southward the genus will assuredly be found in adjacent Mexico, probably quite extensively over the northern plateau and mountains. For those regions, however, the genus is yet known from but a single "Lower California" record of *americana*.

In the present study of *Parcoblatta*, 2852 specimens have been examined, of which 2025 are in the Philadelphia collections.

Parcoblatta bolliana (Saussure and Zehntner) (Plate III, figures 1 to 3.)

1893. *Ischnoptera bolliana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 4. [♂: New Mexico, and Texas.]

1904. *Kakerlac schaefferi* Rehn, Psyche, xi, p. 72. [♀, Esperanza Ranch near Brownsville, Texas.]

The above synonymy has been indicated by Rehn and Hebard,[111] *schaefferi* having been based on the then unrecognized female of this species.

This insect is very distinct from any other of the genus. The males of this species and of *P. desertae* differ, from all other known males of the genus, in the unspecialized median and dorsal abdominal segments. The females, with those of *P. americana*, show the greatest tegminal reduction found in this sex of the genus;

[111] Proc. Acad. Nat. Sci. Phila., 1910, p. 449, (1910).

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similar, but more ample, lateral subtriangular pad-like tegmina are, however, found in the females of *P. desertae* and *P. uhleriana*.

Compared with *desertae*, the males are found to differ: in the narrower interocular space; dark colored head, even in the palest specimens; more pronounced pronotal sulci; distinctly more produced supra-anal plate, with free margin less truncate between the cerci; shorter cerci with joints decreasing more rapidly in size distad, and more nearly symmetrical subgenital plate, the plate at the dextral style not being more produced than at the sinistral style, the margin between these transverse.

The very dark females, with minute, lateral tegmina, which scarcely extend beyond the caudal margin of the metanotum, could only be confused with those of *americana*. The present species averages smaller, and the females are more compact, with interocular space equalling that between the antennal sockets, with tegmina showing hardly any traces of venation and with supra-anal plate less strongly and more bluntly produced.

Characters of Male.—(Waco, Texas.[112]) Size small for the genus, form slender. Interocular space four-fifths (varying in the series to fully as wide as) interocellar space. Ocelli well defined. Area between eyes and ocelli appreciably flattened to a point just above the antennal sockets, with surface slightly roughened and showing microscopic transverse folds. Maxillary palpi delicate, with third and fifth (distal) joints subequal in length, each longer than fourth joint. Pronotum with greatest width slightly caudad of mesal point, oblique sulci of disk very decided and connected caudad by a short, transverse, arcuate impression. Tegmina and wings normal, fully developed; wings (in the series) with two to five incomplete and two to five complete rami of the ulnar vein. Median and dorsal abdominal segments unspecialized. Supra-anal plate weakly deplanate and weakly declivent distad, about twice as broad as long, free margin convex from above the cerci, but with mesal portion showing some weakening of the curvature. Cerci short with nine (normal) distinct joints, these decreasing rapidly in size distad. Genital hook situated sinistrad, a sharply recurved chitinous process, with recurved portion straight and very elongate and directed almost parallel to the basal shaft; mesad and adjacent, is situated a very slender and much shorter, moderately curved, aciculate, chitinous process. Subgenital plate with surface moderately convex except distad, where it is weakly deplanate; lateral third of free margin, on each side, nearly straight and moderately convergent, mesal third nearly straight, transverse; at the distal angles thus formed are situated, in weakly defined sockets, simple slender styles, similar in size and form and in length equal to half the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which

[112] The "Texas" type was probably taken at Dallas, or at this not distant locality.

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is folded ventrad over the base of the subgenital plate, decidedly elongate, nearly twice as long as exposed portion of seventh ventral abdominal segment.

The transverse flattening of the distal margin of the supra-anal plate is in some males before us very weakly defined, in occasional specimens pronounced. Numerous microscopic hairs are present on pronotum and tegmina.

Characters of Female.—(Austin, Texas.) Size small, form ellipitical, stout and compact, with dorsal surface moderately convex and glabrous. Head much larger, distinctly broader and more convex than in male. Interocular space subequal to that between antennal sockets; minute ocellar spots present. Maxillary palpi short and stout. Pronotum decidedly broader, convex and smooth, without sulci; caudal margin transverse with a very weak convexity, lateral margins finely but distinctly cingulate. Tegmina lobiform, lateral, widely separated, extending very slightly beyond caudal margin of mesonotum, surface glabrous with hardly a trace of venation, costal margins finely but distinctly cingulate. Wings absent. Supra-anal plate with a blunt, medio-longitudinal carina, rather weakly produced, lateral free margins beyond cerci very weakly convex, convergent to the broadly rounded apex. Cerci very short, lateral margins entire, dorsal surface deplanate. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Tryon, North Carolina	(9)	10.2–11.8	2.7–2.9	3.6–4	12.2–13.6	4–4.4
Brunswick, Georgia...		11	2.7	3.8	12.1	3.9
Iowa City, Iowa.....		12.8	3	4.2	13.3	4.6
Mountain Grove, Missouri.....		12.3	2.8	3.8	13.1	4.3
Waco, Texas.....	(11)	10.1–12.3	2.7–2.9	3.7–3.9	11.7–12.3	3.8–4
♀						
Raleigh, North Carolina	(4)	9.7–10.7	2.9–3	4.3–4.4	1.7–1.8	1.4–1.6
Atlanta, Georgia.....		9.8	3	4.1	1.8	1.6
Austin, Texas.....		9	2.8	4.1	1.9	1.7
Sabinal, Texas.....		9.8	2.9	3.9	1.7	1.6
Brownsville, Texas....		10.4	3	4	1.8	1.6

Little variation is found in the species, except the striking color differences shown by the males of the extremes of intensive and recessive coloration.

Coloration.—♂. (Intensive.) Head shining blackish chestnut brown, ocelli light buff; antennae dark dresden brown. Coxae, limbs, lateral margins of pronotum and marginal field of tegmina buckthorn brown. Abdomen and remaining portion of pronotum (the transition there not sharply defined) shining blackish chestnut brown, the latter with a mesal ochraceous area between the

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discal sulci. Tegmina of the same color proximad, translucent; fading toward buckthorn brown distad. This condition is normal in eastern material, showing individual different degrees of intensity in each series. The material from Kansas, Oklahoma and Brownsville, Texas, is about intermediate, while the remaining Texan series show individuals which are moderately paler or of the extreme recessive coloration. (Recessive.) General color of entire insect ochraceous-buff, becoming paler on lateral margins of pronotum and marginal field of tegmina and ochraceous-tawny toward the subgenital plate. Head shining blackish chestnut brown, ocelli light buff, clypeus of the general coloration. No exceptions to the very dark cephalic coloration appear to occur. ♀. Shining blackish chestnut brown, femora slightly paler, remaining portions of limbs and the cerci dark chestnut. Minute ocellar spots buffy.

The ootheca is carried with suture laterad. Its surface is smooth, with rather widely spaced transverse divisions. The suture bears minute, rather widely separated knobs; these are, however, less widely spaced than the transverse divisions.

This species is not as frequently encountered as many of the genus. Its range is known to extend from Raleigh, North Carolina and Brunswick, Georgia,[113] westward to the Mexican border. Though described, in part, from New Mexico, our most western records are Ellis, Kansas and Rio Frio, Texas. Northward in the Mississippi Valley region, it is known as far as Nebraska City, Nebraska and Iowa City, Iowa.

Specimens Examined: 86; 72 males, 12 females and 2 immature individuals.

Raleigh, North Carolina, V, 8 to VI, 21, 1904 and 1905, (C. S. Brimley; bred and at light), 7 ♂, 4 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Tryon, N. C., V, 20, (W. F. Fiske; at light), 1 ♂; (W. F. Fiske), 10 ♂, [all U. S. N. M.].

Sulphur Springs, near Asheville, N. C., V, 26 to VI, 9, 1904, (Hebard; rare at light), 5 ♂, [Hebard Cln. and A. N. S. P.].

Swansea, South Carolina, VI, 1908, (C. C. Craft), 1 ♂, [U. S. N. M.].

Clayton, Georgia, 2000 to 3700 feet, VI, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Atlanta, Ga., VII, 6, 1909, 1 ♂, [A. N. S. P.].

[113] Blatchley's record of this species from Ormond, Florida, is properly referred to *I. deropeltiformis* in the present paper.

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Brunswick, Ga., 1 ♂, [A. N. S. P.].
Southern Illinois, (C. Thomas), 1 ♂, [M. C. Z.].
Iowa City, Iowa, VI, 12, 1915, (M. P. Somes), 1 ♂, [Somes Cln.].
Keokuk, Ia., VI, 17, 1915, (M. P. Somes), 1 ♂, [Hebard Cln.].
Mountain Grove, Missouri, V, 14 and 16, 1914, (M. P. Somes), 1 juv. ♂, 1 juv. ♀; VI, 17, 1914, (M. P. Somes), 1 ♂; VII, 21, 1916, (for Somes; trapped, molasses jar), 1 ♂, 1 ♀, [all Somes Cln.].
Baton Rouge, Louisiana, VI, 1905, (A. W. Morrill; at light), 1 ♂, [U. S. N. M.].
Nebraska City, Nebraska, VI, 1 ♂, [Hebard Cln.].
Lawrence, Kansas, VI, (E. S. Tucker), 2 ♂, [Univ. Kansas Cln.].
Douglas County, Ks., VI and VII, (E. S. Tucker), 2 ♂, [Univ. Kansas Cln.].
Wichita, Ks., VI, 17, 1904, (F. B. Isely), 1 ♂, [U. S. N. M.].
Ellis, Ks., (L. Watson), 1 ♂, [M. C. Z.].
Stillwater, Oklahoma, 1897, (A. B. McReynolds), 1 ♂, [U. S. N. M.].
Perkins, Okla., (A. N. Caudell), 1 ♂, [U. S. N. M.].
Paris, Texas, V, 11 to 20, 1914, (at light), 10 ♂, [U. S. N. M.].
Waco, Tex., V, 20 to VII, 10, (Belfrage), 12 ♂, [M. C. Z.].
Hockley, Tex., (F. W. Thouron), 1 ♂, [U. S. N. M.].
Dickinson, Tex., VII, 20, 1912, (Hebard; under dry cow dung in pine woods), 1 ♀, [Hebard Cln.].
Round Mountain, Tex., 2 ♂, [A. N. S. P.].
Austin, Tex., (W. M. Wheeler), 1 ♀, [Am. Mus. Nat. Hist.].
Rio Frio, Tex., V, 10, 1910, (F. C. Pratt; at light), 1 ♂, [U. S. N. M.].
Sabinal, Tex., VI, 2, 1910, (F. C. Pratt), 1 ♀, [U. S. N. M.].
Sharpsburg, Tex., V, 10, (E. A. Schwarz), 1 ♂, [U. S. N. M.].
Nuecestown, Tex., IV, 27, 1896, (Marlatt), 1 ♀, [U. S. N. M.].
San Diego, Tex., VI, 12, (E. A. Schwarz), 1 ♂, [U. S. N. M.].
Brownsville, Tex., V, (H. S. Barber), 1 ♀, [U. S. N. M.].
Esperanza Ranch, near Brownsville, Tex., V, (C. Schaeffer), 2 ♂, 1 ♀, latter *type* of *K. schaefferi* Rehn, [Bklyn. Inst.].
Point Isabel, Tex., V, 11, 1904, (H. S. Barber), 1 ♀, [U. S. N. M.].

Parcoblatta desertae (Rehn and Hebard) (Plate III, figures 4 to 6.)

1903. *Ischnoptera bolliana* Rehn (not of Saussure and Zehntner, 1893), Ent. News, xiv, p. 325, 330. (In part.) [♂, Shovel Mountain, Texas.].
1909. *Ischnoptera desertae* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 116, fig. 1. [♀, Johnstone, Valverde County, Texas.].
1910. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 450, fig. 27. (In part.) [2 ♂, Shovel Mountain, Texas.].
1912. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1912, p. 104. [Single type designated: ♂, Shovel Mountain, Texas.]

The male sex, described as *I. insolita*, is shown unquestionably by the series now before us to represent that sex of the present

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species. Rehn and Hebard's revision of 1912 was undertaken primarily for the purpose of showing that the genera *Temnopteryx*, *Kakerlac* and *Loboptera* had in reality no place among the forms found in the United States, and for giving additional information on the majority of the species. At that time the available material was admittedly insufficient to place correctly all of the species and associate their sexes.

The present species shows nearest relationship to *P. bolliana*, the males differing conspicuously in the features given in the comparison with that species on page 78. The females are readily distinguished by their paler coloration; width of interocular space, which is slightly but distinctly greater than that between the antennal sockets; decidedly more elongate tegmina, which, however, are also lateral, and presence of vestigial wings. The female supra-anal plate is more sharply produced, in this respect agreeing more nearly with *P. americana*, but with lateral free margins beyond the cerci not as decidedly concave as in that species.[114]

Characters of Male.—(Sabinal, Texas.) Size small for the genus, form slender. Interocular space faintly narrower than that between the antennal sockets, much wider than that between the ocelli. Ocelli well defined. Head more evenly rounded than in *bolliana*, with inter-ocular-ocellar area glabrous, showing a few microscopic pits. Maxillary palpi slightly heavier than in *bolliana*. Pronotum deeper than in that species; with greatest width distinctly caudad of mesal point; oblique sulci moderately decided, but by no means as pronounced as in *bolliana*. Tegmina and wings normal, fully developed; wings (in the series) with one to three incomplete and three to five complete rami of the ulnar vein. Median and dorsal abdominal segments unspecialized. Supra-anal plate strongly transverse, fully three times as broad as long, free margin beyond the cerci weakly convex and broadly, though weakly, flattened mesad, of a somewhat similar type to that of *bolliana*, but showing decidedly greater truncation.[115] Cerci more elongate than in *bolliana*,[116] decreasing more evenly and less rapidly in size distad. Genital hook situated sinistrad, a sharply recurved, chitinous process, with recurved portion moderately elongate, stouter and shorter than in *bolliana* and not as strongly recurved; mesad and adjacent is situated a very slender, elongate, very weakly curved, aciculate process.

[114] Females are fully compared with that sex of *P. uhleriana*, under that species.

[115] The meso-distal portion of this plate is normally bent slightly downward; its degree of truncation is variable, a male from the Chisos Mountains, Texas, showing an even convexity of this margin, while that from Rio Frio, Texas, shows a blunted, rotundato-trigonal condition.

[116] The series shows eight to ten, normally nine, distinct joints.

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Subgenital plate with surface weakly convex, except disto-laterad toward base of styles, where it is weakly concave, free margin briefly produced and straight laterad, then in lateral third of remaining portion, on each side, moderately concave, the remaining distal third nearly transverse, showing a weak concavity and a very slightly greater dextral production of the plate; at the disto-lateral angles thus formed are situated, in sockets whose dorsal surfaces are weakly raised on the dorsal surface of the plate,[117] simple, slender styles, similar in size and form and in length equalling two-fifths the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, short, no longer than the exposed portion of the seventh ventral abdominal segment.

Characters of Female.—(*Type.* Johnstone, Valverde County, Texas.) Size small, not as compact as in *bolliana.* Head larger and more convex than in male. Interocular space considerably wider than that between antennal sockets; minute ocellar spots present. Maxillary palpi short and stout. Pronotum proportionately longer than in *bolliana.* Tegmina elongate, lateral pads, with apices rounded, widely separated, reaching base of median segment, surface with veins appreciable, weakly convex to marginal field, which is weakly concave, with costal margin cingulate. Wings represented by small, vestigial pads, falling distinctly short of the tegminal apices. Supra-anal plate triangularly produced, free margins at bases of cerci showing a very broad and weak triangular production, thence concavo-convergent to the slightly blunted apex. Cerci very short, lateral margins entire, with dorsal surface weakly convex. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen [118]	Width of tegmen
Shovel Mountain, Texas (2)	12–12.2	2.8– —	3.8– —	11.2–12	3.6–3.7
Rio Frio, Texas.....	13.5	3.1	4..1	12.3	3.8
Sabinal, Texas..... (2)	11.3–13.3	3.1–3.1	4–4.1	12–12.7	3.9–4
Chisos Mountains, Texas..... (2)	13.2–13.8	3.2–3.3	4–4.3	13.6–14.5	4.6–4.8
♀					
Johnstone, Texas, *type*.	9.5	3	4.2	3	2.1
Fort Davis. Texas..... (2)	12–11.5	3.2–3.6	4.4–4.8	3.5–3.4	2.3–2.3
Chisos Mountains, Texas	11.6	3.3	4.7	3.4	2.2

The type was taken in a relatively bare area of reduced vegetation, which probably accounts for its small size and certainly explains its pale coloration. The other females are all from more mountainous localities, these regions showing generally a decidedly less reduced vegetation.

[117] This convexity is slightly more pronounced at the dextral socket.

[118] The length of the exposed portion of the female tegmen is given.

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Coloration.—♂. General coloration light ochraceous-buff, becoming ochraceous-buff on the pronotal disk and tawny mesad and distad on the ventral surface of the abdomen. Eyes blackish brown. Tegmina semi-transparent, ochraceous-buff, with marginal field light ochraceous-buff. Wings hyaline, the area of the costal veins and distal portion of the anterior field weakly tinged with buffy.

♀. (*Type.* Recessive.) Head, pronotum and ventral surface of abdomen dull ochraceous-orange, the lateral portions of the pronotum shading to ochraceous-buff. Tegmina transparent ochraceous-buff. Mesonotum, metanotum and dorsal surface of abdomen russet. Limbs buff. (Other females. Intensive.) Head, pronotum, mesonotum and metanotum russet, the pronotum shading to ochraceous-tawny laterad. Abdomen shining blackish brown, tinged with russet ventro-mesad. Tegmina transparent russet, with marginal field ochraceous-tawny. Limbs ochraceous-buff, tinged with tawny distad.

The known material of the present species is recorded below; from the mountains, arid and sub-arid regions of central, south-central and western Texas. Doubtless it is widely distributed over the similar adjacent regions in Mexico.

Specimens Examined: 13; 9 males and 4 females.

Shovel Mountain, Burnet County, Texas, VII, 21 and 25, 1901, (F. G. Schaupp), 2 ♂, *type* and *paratype* of *I. insolita* Rehn and Hebard, [A. N. S. P.].

Rio Frio, Tex., V, 11, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.].

Sabinal, Tex., V, 26, 1910, (F. C. Pratt; at light), 2 ♂, [U. S. N. M.].

Nueces River, Zavalla County, Tex., VI, 29, 1910, (F. C. Pratt), 2 ♂, [U. S. N. M.].

Johnstone, Tex., VII, 8, 1907, (Hebard; under small boulder on desert), 1 ♀, *type*, [Hebard Cln.].

Fort Davis, Tex., VII, 11, 1911, (H. A. Wenzel), 2 ♀, [A. N. S. P. and Hebard Cln.].

Chisos Mountains, Tex., VI, 10 to 12, 1908, (Mitchell and Cushman; at light), 2 ♂, [U. S. N. M.]; VII, 22, 1911, (H. A. Wenzel), 1 ♀, [A. N. S. P.].

Parcoblatta americana (Scudder) (Plate III, figures 7 to 9.)

1900. *Loboptera americana* Scudder, Proc. Davenport Acad. Sci., viii, p. 93, pl. 2, fig. 4. [1 ♀, Ehrenberg, Arizona.]

1910. *Ischnoptera americana* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 420, figs. 7 and 8. [♂, ♀: Oregon; Ormsby County, Nevada; Bair's Ranch, San José, Los Angeles and Pasadena, California; Lower California.]

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The present species has been twice incorrectly recorded as *I. consobrina* Saussure, by Rehn in Baker, and by Rehn and Hebard, while the California males included with the original description of *I. notha* by the latter authors, are here correctly referred to the recessive color condition found in the present species.

Great variation is found both in size and color in this species, due probably to environmental conditions and, particularly, to the effect of different degrees of aridity.

The males showing intensive coloration are much darker than this sex of any other solidly colored species of the genus. They agree with *P. bolliana* in the normally very decided pronotal sulci, while the head is also darkened even in the palest examples. The gland development of the median segment is distinctive, the nearest similarity being found in *P. zebra*. The supra-anal plate suggests a further development of the type found in *P. notha*.

The female shows nearest resemblance to that sex of *P. bolliana*, but is readily separated by the features discussed under that species.

Description of Male.—(Pasadena, California.) Size rather small, form slender. Interocular space about as wide as the space between the antennal sockets. Ocelli not strongly defined, so that the space between the antennal sockets is very slightly wider than that between the ocelli. Area between eyes and ocelli weakly convex, much as in *P. desertae*, but microscopically roughened, with more pronounced pits. Pronotum and discal sulci much as in *bolliana*, but with point of greatest width slightly more caudad. Tegmina and wings normal, fully developed. Wings with distal branches of discoidal vein longer and with more forks than is usual in *bolliana* or *desertae;* ulnar vein (in series) with three to five incomplete and four to six complete rami. Median segment with a small, quadrate, mesal tuft of agglutinated hairs; other dorsal segments unspecialized. Supra-anal plate deplanate, declivent distad (or with meso-distal produced portion decidedly deflexed),[119] about twice as broad as long, lateral margins weakly convex-convergent to within cercal bases, then concave-convergent to broadly rounded apex. Cerci elongate, tapering rather evenly to apex, with (normally) eleven distinct joints.[120] Genital hook situated sinistrad, a sharply recurved, chitinous process, with recurved portion moderately

[119] From the material at hand, it appears that this portion of the plate can, in life, be deflected at will by the insect; dried specimens, showing a strong deflection, led Rehn and Hebard to assign them incorrectly to *notha*, in which species a constant deflection of the median portion of the plate apparently occurs.

[120] The usual variation in number of apparent cercal joints occurs in the species; one male before us has but nine distinct cercal joints on each side.

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elongate, hollow ventrad, with lateral margins roundly expanding, then narrowing and at the rounded apex again moderately expanding; mesad and adjacent is situated a very slender, elongate, aciculate process which (sometimes) is weakly curved at its apex. Subgenital plate produced, with proximal portion weakly convex and distal portion deplanate-ascendent,[121] lateral margins weakly convex and weakly convergent, rounding distad into the weakly oblique, nearly straight distal margin, the dextral angle thus formed being slightly the more produced. On the ventral surface of this plate, at these disto-lateral angles, are situated, in small sockets, simple, slender styles, deflexed so that they lie on the ventral surface of the plate, in length equalling half (or frequently more than half) the distance between their bases.[122] Exposed portion of eighth dorsal abdominal segment, which is folded laterad over the base of the subgenital plate, short, slightly longer than exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Topotype. Ehrenberg, Arizona.) Size small, not as compact as in *bolliana*, but with pronotal proportions similar. Head larger and more convex than in male. Interocular space considerably wider than that between antennal sockets, minute ocellar spots present. Maxillary palpi short and stout. Tegmina widely separated, form much as in *bolliana*, reaching very slightly beyond caudal margin of mesonotum, veins appreciable, surface weakly convex to marginal field, which is weakly concave with costal margin cingulate. Wings absent. Supra-anal plate with lateral margins weakly convex and nearly transverse proximad, thence weakly concave and strongly convergent to rather sharply rounded apex. Cerci very short, much more compressed than in male, fusiform, with dorsal surface weakly convex. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Oregon	(2)	12–13.6	3–3.6	4–4.6	14–15.8	4.3–5
Mount Shasta, California	(2)	14–14.3	3.3–3.4	4.1–4.3	15.2–17	4.4–5.3
Sonoma County, California	(7)	13.5–14.8	3.3–3.7	4–5	14.8–16.3	4.6–5
Fresno, California	(2)	12.2–13.8	3.3–3.3	—–4.2	13.6–13.8	4.2–4.2
Lower California, Mexico		12.7	2.8	3.8	13.7	4.3

[121] Rarely the distal margin, at the bases of the styles, is narrowly curved downward.

[122] In the males of the present species, the margins of the subgenital plate are often subchitinous and show various degrees of individual irregularity, as do the styles both in actual length and position.

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♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Oregon		12	3.8	4.9	2.1[123]	1.9
Bair's Ranch, California		10.2	3.3	4.6[124]	1.9	1.7
Mount Shasta, California	(3)	13.2–13.3	3.8–3.9	4.9–5.7	2.2–2.4	2–2.2
Cahon Pass, California.		11.1	3.1	4.3	1.9	1.8
Ehrenberg, Arizona, *topotype*		8.8	2.8	3.8	1.4	1.6

The type and topotype were taken in a region of extreme aridity which probably explains their small size and coloration, which latter is paler than in females from the Pacific coast. Rather decided individual variation in size is, however, further shown by the series before us.

Coloration.—♂. (Intensive. Two, Mount Shasta, and one, Sonoma County, California.) General coloration of head, pronotum, abdomen, limbs and tegmina shining prout's brown, the tegmina translucent, the dorsal surface of the abdomen shading proximad to ochraceous-buff. Ocelli ochraceous-buff. Wings hyaline, all but the proximal portion of the anterior field weakly suffused, the area of the costal veins heavily suffused with prout's brown. In the paler conditions these areas are similarly suffused, but with the paler color of the tegmina. (Intermediates; to different degrees, all of the remaining series except the three recessive examples.) Head, underparts and limbs tawny russet. Ocelli light buff. Pronotum tawny, occasionally slightly paler toward the lateral margins. Tegmina transparent buckthorn brown, marginal field and distal portions paler. Dorsal surface of abdomen ochraceous-tawny. (Recessive. Two, Fresno, and one, Riverdale, California.) General coloration ochraceous-buff suffused with tawny, ventral surface of abdomen mesad and distad shading to tawny. Head russet, except ocelli and clypeus which are ochraceous-buff.

♀. (Topotype. Recessive.) Shining bay in general coloration, becoming slightly darker on dorsal surface of abdomen. Ocellar spots buffy. Limbs auburn. The specimens from Cahon Pass,

[123] The length of the exposed portion of the female tegmen is given.

[124] This specimen is dried alcoholic and shrivelled, this dimension is approximate.

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California, are darker, the pronotum, mesonotum, metanotum and tegmina tinged with chestnut. (Intensive. Mt. Shasta, California.) Head, dorsal surface and tegmina shining black with a weak brown tinge, this slightly greater cephalad. Ocellar spots buffy. Underparts shining blackish bay, limbs shining deep bay.

Outside of the records given below, the species is known only from Ormsby County, Nevada, San José, and Los Angeles, California and from a single male from Lower California, taken by G. W. Dunn, in the Hebard Collection ex Bruner. Over this entire region no other species of the genus is known.

Specimens Examined: 48; 27 males, 9 females, 12 immature individuals.

Oregon, (Washburn), 2 ♂, 1 ♀, [Hebard Cln. ex Bruner].

California, 2 ♂, [Hebard Cln.].

Bair's Ranch, Humboldt County, Cal., VI, 9, 1903, (H. S. Barber), 1 ♀, (dried alcoholic), [U. S. N. M.].

Mount Shasta, base of, Cal., V, 1912, VI, 1914, 2 ♂, 3 ♀, [Davis Cln.].

Eldridge, Cal., X, 30, 1915, (J. A. Kusche), 1 nearly adult ♂, 5 medium small immature ♂, 4 medium small immature ♀, [Hebard Cln.].

Sonoma County, Cal., 7 ♂, [Bklyn. Inst.].

Stanford University, Palo Alto, Cal., IV, 8, 1910, (W. M. Mann), 1 juv. ♀, [Hebard Cln.].

Fresno, Cal., VI, 29, 1900, (E. A. Schwarz), 2 ♂,[125] [U. S. N. M.].

Riverdale, Cal., VII, 5, 1898, (A. A. Eaton), 3 ♂,[126] [U. S. N. M. and Hebard Cln.].

Three Rivers, Tulare County, Cal., VII, 28, 1911, (J. C. Bradley; 1 at light), 2 ♂, [Cornell Univ. Cln.].

Fort Crook, Cal., 1 ♂, [M. C. Z.].

Cahon Pass, Cal., VII, 18, 1897, (A. P. Morse), 2 ♀, [Morse Cln.].

Mount Wilson, San Gabriel Mountains, Cal., IX, 15, 1908, (F. Grinnell Jr.), 1 juv. ♂, [A. N. S. P.].

Pasadena, Cal., (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

San Gabriel, Cal., VI, 1892, (C. E. Hutchinson), 1 ♂, [U. S. N. M.].

Claremont, Cal., VI, 8, 1900, 1 ♂, [A. N. S. P.].

Los Angeles County, Cal., (D. W. Coquillett), 2 ♂, [U. S. N. M. and Hebard Cln.].

Verdi, Nevada, VII, 1 ♂, [U. S. N. M.].

Ehrenberg, Arizona, (E. Palmer), 2 ♀, *type* and *topotype* taken with *type*, [M. C. Z.].

[125] Incorrectly recorded by Rehn and Hebard as *notha*.

[126] Incorrectly recorded by Rehn and Hebard as *notha*.

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Parcoblatta zebra[127] new species (Plate III, figures 10 to 14.)

1893. *Ischnoptera uhleriana* Saussure and Zehntner, (not of Saussure, 1862), Biol. Cent.-Amer., Orth., i, p. 36. [♀: Georgia; Texas, and New Mexico; (in part).][128]

1893. *Ischnoptera uhleri* Saussure and Zehntner, ibid., pl. III, figs. 21 and 22. (Lapsus calami.[129]) (In part.) [Figures of female described on page 36.]

1910. *Ischnoptera divisa* Rehn and Hebard, (not of Saussure and Zehntner, 1893), Proc. Acad. Nat. Sci. Phila., 1910, p. 430. (In part.) [♀, Rives, Tennessee.]

Males of this species are distinctive in the specialization of the median segment, which is supplied mesad with a broad, heavy tuft of agglutinated hairs, directed cephalad, with segment furnished with a low transverse ridge toward the cephalic margin, which ridge is furnished, cephalad of the heavy hair tuft, with a fringe of hairs directed caudad, these briefly overlapping the hairs of the tuft. In the position of this organ, the species agrees alone with *P. americana*, but decidedly greater specialization than in that species is shown. The tegminal discoidal sectors show scarcely any radiation, all being feebly oblique, nearly longitudinal.

The pale dorsal coloration, with dark transverse bands on the abdomen, readily distinguishes females showing this, the normal, condition from those of any other species of the genus. Saussure and Zehntner's excellent figures in the Biologia represent a female, showing a less intensive coloration, but in other respects in every way typical. Females of less decided coloration might alone be confused with those of *P. divisa*, but, over the area of coincident distribution, females of that species have the head normally decidedly more flattened.

The general appearance of the insect suggests a small and rather pale member of the complex to which we assign *divisa* and *P. pensylvanica*. The male abdominal characters, however, clearly demonstrate that it is a distinctive form, agreeing in a few features with *americana* and *P. notha*, but widely separated from both.

[127] In allusion to the distinctive female coloration.

[128] Both the latter localities may apply to the present insect, though unknown to us from west of central Texas. Both the description and plate give no indication of the locality from which the specimen figured came. See page 114, footnote 175.

[129] Explained in list of plates, p. VII, (1900). The type for this name is selected in the present paper as the figured male, pl. III, fig. 23; *uhleri* consequently falling in the synonymy under *P. fulvescens*.

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Type.—♂; Pulaski, Illinois. June 9, 1907. [Hebard Collection, Type No. 426.]

Description of Type.—Size rather small, form slender. Interocular space narrow, appreciably less than that between the ocelli and approximately two-fifths that between the antennal sockets. Ocelli strongly defined; inter-ocular-ocellar area distinctly flattened and showing a weak concavity, with surface bearing microscopic, rather decided, irregular pits and transverse rugae. Pronotum with greatest width slightly caudad of mesal point, oblique sulci of disk decided. Tegmina and wings normal, fully developed. Median segment as described above. Other dorsal segments unspecialized; sixth with caudal margin transverse; seventh transversely decidedly narrower, with caudal margin very feebly emarginate, nearly transverse; eighth with caudal margin weakly oblique produced laterad, with mesal portion nearly transverse. Supra-anal plate with lateral margins strongly convergent and feebly concave to a point beyond cercal bases, thence weakly convergent and convex to broadly rounded apex, surface weakly convex above styles, remaining proximal portion weakly concave, distal portion concave and strongly declivent, thus forming at the juncture with the proximal portion a distinct, transverse, weakly arcuate ridge. Cerci slender, not decidedly elongate, with lateral margins rather decidedly crenate meso-distad. Genital hook rather short and slender, subequal in diameter throughout, with distal half rather sharply recurved. Subgenital plate weakly convex, except distad toward bases of styles, where it is rather decidedly concave, lateral margins moderately convex convergent in proximal half, thence weakly concave convergent to styles, where the plate is very briefly and roundly produced, between the styles the distal margin is weakly concave, feebly oblique, as the plate at the dextral style is very slightly more produced; styles small, simple, cylindrical processes, situated in sockets on ventral surface of plate, on the very brief rounded disto-lateral projections which are weakly ascendent, the dorsal surface of the plate there showing no elevation, the dextral style slightly the longer, equalling approximately half the distance between the bases of the styles. Exposed folded ventral portion of eighth dorsal abdominal segment in length (normal position) slightly greater than exposed portion of seventh ventral abdominal segment.

From the additional males it is evident that the margins of the disto-dorsal abdominal segments, supra-anal and subgenital plates show some variability in the present species. The distal portion of the supra-anal plate is also variable in degree of declivity. The wings have one to three incomplete and four complete rami of the ulnar vein in the three males before us.

Allotype.—♀; Havana, Illinois. August 14, 1907. [Hebard Collection.]

Description of Allotype.—Size decidedly larger and more robust than male. Head much more evenly rounded, with ocellar spots clouded and subobsolete. Interocular space much broader than in male, distinctly less than width between antennal

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sockets. Pronotum more ample than in male, with point of greatest width near caudal margin, discal sulci obsolete. Tegmina decidedly reduced, less than twice as long as anal field, broadly sub-lanceolate, with apex in discoidal field and rather sharply rounded. Wings decidedly atrophied, falling slightly short of apex of anal field of tegmina, but with fields and veins fully defined. Sixth dorsal abdominal segment with distal margin broadly convex, except in very brief lateral portions where it is weakly concave, extending over brief proximo-mesal portion of supra-anal plate. Supra-anal plate nearly half as long as wide, projecting beyond distal margin of subgenital plate, lateral margins weakly concave and convergent to between bases of cerci, thence nearly straight, convergent to the sharply rounded apex. Cerci decidedly shorter than in male, with lateral margins very feebly crenate meso-distad. Subgenital plate convex, with distal margin broadly convex and somewhat flattened, subtruncate in mesal section.

Two additional females before us have the lateral margins of the supra-anal plate more strongly concave, the apex varying also slightly in form.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Knox County, Indiana	15	3.6	4.7	16.1	5.4
Pulaski, Illinois, *type*	13	3.1	3.9	13.9	4.3
Dallas, Texas	15	3.7	4.6	15.7	5.1
Victoria, Texas	16	3.7	4.7	15.2	4.9
♀					
Knox County, Indiana	11.5	3.8	5.2	7.7	3.8
Havana, Illinois, *allotype*	14.5	3.9	5.1	7.1	3.7
Rives, Tennessee	11.7	3.9	5	7.7	3.7
Lakeview, Mississippi	12.3	3.7	4.8	6.9	3.6

The very small series before us shows very decided size and color variation.

Coloration.—♂. (*Type.*) Head, including ocelli, cinnamon-buff, with a vertical band of prout's brown from between the ocelli to the mesal portion of the clypeus. Ventral surface of body, including the proximo-lateral portions of the coxae, warm sepia, remaining portions of limbs cinnamon-buff. Ventral surface of abdomen cinnamon-buff; each segment, including subgenital plate, suffused laterad with warm sepia, but leaving the immediate lateral margins pale. Pronotum with disk, between the sulci, sayal brown, remaining portions transparent, tinged with cinnamon-buff. Tegmina transparent buffy brown. Wings hyaline, with veins, area of costal veins and distal portion of anterior field tinged with buffy

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brown. Dorsal surface of abdomen sayal brown, with lateral, broken, suffused bands of chestnut brown, leaving narrow lateral margins of cinnamon-buff. Cerci warm sepia. The male from Dallas, Texas, differs in having the discal sulci warm sepia, the intervening space tawny. That from Victoria, Texas, shows an extreme recessive condition with general coloration weak cinnamon-buff, the tegmina with a pearly luster,[130] pronotum with disk cinnamon-buff, the abdomen with lateral dark markings, above and below, represented only by single small dots of verona brown on each segment, the median segment hair-tuft mikado brown.

♀. (*Allotype.*) Head with vertex pale ochraceous-tawny, below this the face is marked with a subquadrate patch of verona brown, remaining portions of face cinnamon-buff, ocelli feebly indicated in that color. Limbs cinnamon-buff. Ventral surface of abdomen with each segment warm sepia, narrowly margined caudad with cinnamon-buff, except the proximal segments, in which the cinnamon-buff covers the entire segment mesad, subgenital plate warm sepia, with a round meso-lateral spot of cinnamon, continued to the lateral margins in cinnamon-buff. Pronotum with broadly suffused, converging lines of verona brown in position of discal sulci, with single dots of the same cephalad, intervening space clouded with sayal brown, remaining portions of pronotum warm buff. Tegmina translucent snuff brown, with marginal fields warm buff. Dorsal surface of abdomen with each segment broadly margined laterad and caudad with warm buff, in remaining portions blackish brown. Supra-anal plate warm buff, suffused with blackish brown proximad. In two other females before us the lines in the position of discal sulci on the pronotum are narrower and weaker, mikado brown. The contrast in the coloration of the dorsal surface of the abdomen is naturally not as decided in specimens of more recessive coloration, while it is also clear that, in drying, the decided natural contrast is often partially lost.

Specimens Examined: 12; 5 males, 4 females, 2 immature males and 1 immature female.

[130] A noticeable feature in recessive males of *P. divisa* and *P. pensylvanica*, not found in the other species of the genus.

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Knox County, Indiana, VI, 8 and 9, 1904, (W. S. Blatchley), 1 ♂, 1 ♀, [Blatchley Cln.].

Havana, Illinois, VIII, 14, 1907, (river shore), 1 ♀, *allotype*, [Hebard Cln.].

Pulaski, Ill., VI, 9, 1907, (bluff), 1 ♂, *type*, [Hebard Cln.].

Rives, Tennessee, VII, 27, (H. Barber), 1 ♀[131] [U. S. N. M.].

Lakeview, Mississippi, VII, 16, 1914, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Hattiesburg, Miss., IX, 11, 1915, (Rehn and Hebard; under sign on short-leaf pines), 2 juv. ♂, [Hebard Cln.].

West Monroe, Louisiana, VIII, 21, 1915, (Rehn and Hebard; in decaying cavity of sweet gum), 1 juv. ♀, [Hebard Cln.].

Mansura, Avoyelles Parish, La., VI, 21, 1909, 1 ♂, [U. S. N. M.].

Dallas, Texas, VI, 1, (J. Boll), 1 ♂, [M. C. Z.].

Victoria, Tex., V, 25, (J. D. Mitchell; at light), 1 ♂, [U. S. N. M.].

Parcoblatta notha (Rehn and Hebard) (Plate III, figures 15 to 19.)

1910. *Ischnoptera notha* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 442, figs. 21 and 22. (In part.) [♂, Huachuca Mountains, Arizona; ♀, Palmerlee, Arizona.[132]]

1912. *Ischnoptera notha* Rehn and Hebard, ibid., 1912, p. 103. [Single Type; ♂, Huachuca Mountains, Arizona.]

All previous records of "*Ischnoptera*" from Arizona, except that of the type of *americana* Scudder, from Ehrenberg, properly apply to the present species, which has been confused with *uhleriana* and "*uhleriana fulvescens*."

The species has not been found outside that state, the reference, as the present species, by Rehn and Hebard, of Saussure and Zehntner's figure of a female as *uhleriana*, probably from Texas or New Mexico, being properly referable to *P. zebra*, as the material now before us clearly shows.

Males of this insect are decidedly the most slender of the larger pale forms of the genus; in the character of the specialization of the median and first dorsal abdominal segments they agree with *P. caudelli* and *P. lata*, but have the projections there found distinctly more pronounced, while the supra-anal plate is distinctive,

[131] Incorrectly recorded by Rehn and Hebard as *divisa*.

[132] Confusion in the above paper unquestionably occurred. The references to Caudell's Arizona records of *uhleriana* were correctly placed under *notha*, but the material upon which these were based, as well as one specimen from the Galiuro Range, Arizona, were unfortunately listed by mistake under *uhleriana fulvescens* and considered in giving the distribution of that insect. With the original description are unfortunately listed three males from California, representing the pale recessive color condition of *americana*.

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in form showing some homology to that of *P. americana*, but considerably more specialized.

This species and *P. caudelli* are the only ones of the pale forms of the genus which, in the females, have complete tegmina and wings. Those of the present species are much larger and more robust than those of *caudelli*, and have the tegmina and wings decidedly shorter, the former with apices falling distinctly short of the apex of the abdomen. In the females of *caudelli* these organs have retained the full power of flight, in those of the present species sustained flight would be impossible.

Characters of Male.—(*Type.* Huachuca Mountains, Arizona.) Size rather large, form slender. Head much as in *caudelli*, rather evenly rounded, with ocelli well defined, but margins of ocellar areas rounding rather weakly into the inter-ocellar-ocular area, which area is feebly flattened, weakly convex, showing a few microscopic punctae. Interocular space narrower than that between antennal sockets, slightly wider than that between ocelli. Pronotum unusually long for the genus, with greatest width distinctly caudad of mesal point and with cephalic angles distinctly more broadly rounded than caudal angles, oblique sulci of disk subobsolete.[133] Tegmina and wings normal, fully developed; the former and anterior field of the latter proportionately narrower than in the other species of the genus; wings (in the small series) with three to four incomplete and four to five complete rami of the ulnar vein. Median segment supplied mesad with two subtriangular, rounded but decided, elevations, with cephalic face of each furnished with a very heavy tuft of hairs, the surface of the segment is also supplied cephalad of these with a very few scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the elevations are not as broad and the scattered hairs cephalad are even less numerous. Sixth dorsal abdominal segment with distal margin nearly straight, transverse. Supra-anal plate with lateral margins proximad weakly convex and nearly transverse to between the cerci, there convex-convergent to the rather broadly rounded apex, the small produced portion with margins thus forming an obtuse angle with those of basal portion; proximal portion transverse and narrow, with surface feebly convex above cerci and feebly concave in intervening area, small produced portion strongly deflexed, with surface concave and strongly declivent distad, thus forming, at the juncture with the proximal portion, a well-defined, rounded and weakly convex, transverse ridge. Cerci elongate and slender, with lateral margins crenate distad. Genital hook showing little narrowing at point of recurvature, and with recurved portion stout and of subequal width throughout. Chitinous, aciculate tip of adjacent process more elongate than usual and weakly curved dextrad only toward apex. Subgenital plate moderately convex, except toward bases of styles, where a slight concavity is indicated; lateral margins moderately convex and feebly convergent in proximal half, then mod-

[133] In the series before us rarely moderately pronounced.

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erately concave and more strongly convergent in distal half, remaining distal portion between styles nearly straight, transverse. Styles[134] simple, cylindrical and tapering, unusually long for the genus, length of each only slightly less than distance between their bases, situated in sockets on the caudal faces of small rounded knobs at the disto-lateral angles of the dorsal surface of the subgenital plate.

Characters of Female.—(*Allotype.* Palmerlee, Arizona.) Very different from male. Size medium large, form stout. Head large and evenly rounded, with interocular space slightly greater than that between the antennal sockets and ocelli weakly defined by pale spots. Pronotum much larger than in male, broader, with greatest width decidedly caudad of mesal point, discal sulci obsolete. Tegmina and wings with area reduced nearly half; tegmina rounded evenly distad, not reaching the base of the supra-anal plate; wings more abbreviate, with distal margin distinctly truncate, showing two incomplete and two to three complete rami of the ulnar vein. Supra-anal plate decidedly less than half as long as broad, with lateral margins convergent and feebly concave to acute apex. Cerci much as in male, but slightly shorter. Subgenital plate with surface convex and distal margin broadly convex.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Galiuro Range, Arizona.....	14.5	3.8	4.8	17.8	4.9
Prescott, Arizona.....	14.6	3.8	4.8	17.8	4.9
Huachuca Mountains, Arizona, *type*.....	17	3.9	4.9	16.7	4.8
Huachuca Mountains, Arizona..	17.5	3.8	4.8	17.3	4.8
Patagonia Mountains, Arizona..	18	4.3	5.3	18.6	5.6
♀					
Santa Rita Mountains, Arizona..	14.7	4.6	5.9	10.2	4
Palmerlee, Arizona, *allotype*.....	14	4.4	5.7	9.4	4.1

Coloration.—♂. (*Type.* Normal.) Head, underparts and limbs light ochraceous-buff, ocelli cream color. Pronotum with disk ochraceous-buff, remaining portions transparent light ochraceous-buff. Tegmina transparent ochraceous-buff. Wings clear hyaline and weakly iridescent, with area of costal veins weakly washed with ochraceous-buff proximad and distad and heavily washed with light buff mesad. Dorsal surface of abdomen light ochraceous-buff, with hair tufts ochraceous-tawny and besides suffused distad with this color. No darker specimens are before us. In the palest specimens at hand the darkest portions, disk of pronotum and hair tufts on abdomen, are ochraceous-buff.

[134] The styles having been destroyed in the type, these features are described from a topotype.

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♀. General coloration auburn, with a strong chestnut tinge. Coxae and proximal portions of limbs ochraceous-buff, tinged with ochraceous-tawny.

Large immature males are found to agree with the female sex in the large, evenly convex head, with widely separated eyes and ocellar spots, pronotal form and absence of discal sulci and form of supra-anal plate.

The known distribution of the species is covered by the records given below. It will unquestionably be found, probably widely distributed, in adjacent northern Mexico.

Specimens Examined: 15; 7 males, 3 females, 5 immature individuals.

Arizona, 1 ♂, [Hebard Cln.].

Prescott, Ariz., 1 ♂, [A. M. N. H.].

Galiuro Range, Ariz., V, 26, (H. G. Hubbard), 1 ♂,[135] [U. S. N. M.].

Sabino Basin, Santa Catalina Mountains, Ariz., 3750 feet, VII, 11, 1916, (Rehn and Lutz; trapped, molasses jar, under oaks), 1 ♀, [A. M. N. H.].

Sabino Canyon, Santa Catalina Mountains, Ariz., XI, 15, 1915, (J. F. Tucker; under bark of willows), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Kit's Peak Rincon, Baboquivari Mountains, Ariz., about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 1 juv., [A. M. N. H.].

Santa Rita Mountains, Ariz., V, 29, 1 ♂, [U. S. N. M.]; VII, (F. H. Snow), 1 ♂,[136] 1 ♀, [U. S. N. M. and Univ. of Kansas Cln.].

Palmerlee, Cochise County, Ariz., (C. Schaeffer), 1 ♀,[137] *allotype*, 1 juv. ♂, [Bklyn. Inst.].

Reef, Cochise County, Ariz., (C. R. Biederman), 1 juv. ♂, [U. S. N. M.].

Huachuca Mountains, Ariz., VIII, 22, 1903, (E. J. Oslar), 1 ♂, *type*,[138] [U. S. N. M.]; 1 ♂ [139] [Bklyn. Inst.].

Patagonia Mountains, Ariz., V, 15, 1903, (E. J. Oslar), 1 ♂,[140] [U. S. N. M.].

Parcoblatta virginica (Brunner) (Plate IV, figures 1 to 5.)

1865. *T[emnopteryx] virginica* Brunner, Nouv. Syst. Blatt., p. 86. [♀, Draper's Valley, Virginia.]

[135] Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

[136] Previous to description incorrectly recorded by Caudell as *uhleriana*. Accidently recorded by Rehn and Hebard under *uhleriana fulvescens*.

[137] Previous to description incorrectly recorded by Rehn as *uhleriana*.

[138] Previous to description incorrectly recorded by Caudell as *uhleriana*.

[139] Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

[140] Previous to description incorrectly recorded by Caudell as *uhleriana*. Accidentally recorded by Rehn and Hebard under *uhleriana fulvescens*.

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1865. *I[schnoptera] borealis* Brunner,[141] Nouv. Syst. Blatt., p. 133. [♂, North America.]

The above synonymy is due to the fact that, at that time, the sexes of the species of the present genus in which the females have decidedly reduced tegmina, were supposed to represent distinct species, universally referred to different genera.

Males of this species are distinctive in the modification of the median segment and in the decided truncation of the supra-anal plate. In general appearance they are nearest males of *P. uhleriana;* which sex of these two species, among the medium small and normally pale forms of the genus, has exceptionally broad tegmina.

Proper association of the sexes of *P. uhleriana* and *P. fulvescens*, and the extensive series of those forms, as well as of the present species, now before us, leaves no room for doubt that the female, described by Brunner as *T. virginica*, represents that sex of the species the male of which was described, on a later page of the same work, as *I. borealis*.

As we now know, the female of *uhleriana* is very different from that of the present species.[142] Brunner's description of *virginica* could only be confused with *fulvescens*, but the females of that species average distinctly larger, are decidedly more robust and more frequently show wide differences in coloration. In addition we would state that, in *virginica*, the females normally have the supra-anal plate with lateral margins straight, convergent to the more acute apex, the caudal margin of the sixth dorsal abdominal segment distinctly less convex and the large proximal spines of the cephalic margins of the cephalic femora fewer than in females of *fulvescens*.

The only other species of the genus, the known females of which have subquadrate tegmina,[143] is *P. lata*, an insect agreeing more closely with *fulvescens*, but much larger and more robust; under *fulvescens* full comparisons are made.

[141] A male of this species is also described on page 134, incorrectly as *I. unicolor* (Scudder). It is merely a specimen of recessive coloration, showing individual differences in the rami of the ulnar vein of the wings.

[142] See description under *uhleriana*.

[143] Females of *Symploce lita* Hebard, show a general resemblance to those of the present species, see page 151.

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Characters of Male.—(Asheville, North Carolina.) Size medium small for the genus, form moderately slender. Interocular space one-half[144] (to slightly less than) the width between the antennal sockets, (normally) appreciably less than the interocellar width. Ocelli well defined. Area between eyes and ocelli appreciably flattened[145] to a point just above the antennal sockets, with surface microscopically roughened. Maxillary palpi much as in *P. bolliana.* Pronotum with greatest width at mesal point,[146] oblique sulci of disk very decided and connected caudad by a short, transverse impression. Tegmina and wings normal, fully developed; tegmina broad, distinctly broader than pronotum, with point of greatest width meso-distad; wings (in the series) with two[147] to five incomplete and four to six complete rami of the ulnar vein. Median segment with a moderately large mesal area supplied with minute scattered hairs. Other dorsal segments unspecialized, distal margin of sixth segment weakly and broadly convex in large mesal portion. Supra-anal plate transverse, truncate, fully four times as broad as long, weakly declivent distad, free margin weakly and briefly concave at bases of cerci, thence strongly convergent and weakly convex to broadly transverse median portion. Cerci slender, with (normally) ten[148] joints, decreasing evenly in size distad. Genital hook situated sinistrad, a chitinous process recurved at less than a right-angle, not as elongate as in *bolliana* and in consequence normally concealed by the short supra-anal plate, least width at point of recurvature; mesad and adjacent is situated a very slender and much longer, nearly straight, chitinous process with sharp apex directed slightly sinistrad. Subgenital plate roughly subquadrate with disto-lateral angles rounded, the rounding of the dextral angle slightly the broadest, the dextral margin is straight, produced to this angle, the sinistral margin is (normally) rather deeply concave just before the sinistro-distal angle,[149] distal margin nearly straight, sub-oblique transverse; surface of plate weakly convex but rather extensively deplanate meso-distad; at the disto-lateral angles are situated, in sockets on the ventral surface of the plate at the free margin, simple, slender styles, similar in size and form, in length (normally) each equal to about three-fifths the distance between their bases.[150] Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, decidedly short, slightly shorter than exposed portion of seventh ventral abdominal segment.

[144] This is the usual condition, though in this species frequent individuals show some difference.

[145] Often weakly concave.

[146] Occasional specimens have the greatest pronotal width very slightly caudad of the mesal point.

[147] The type of Brunner's synonymous *borealis* is described as having but a single complete ramus. This is certainly attributable to individual variation.

[148] Specimens with eleven distinct cercal joints are before us.

[149] Slight variation in the free margins of the subgenital plate is frequent. The concavity of the sinistral margin, just before the sinistro-distal angle, is sometimes deep, rarely subobsolete. The distal margin often shows a slight concavity.

[150] Slight variation in these appendages and in the distal diameter of the plate, results in occasional specimens showing styles with length of each one-half to two-thirds the distance between their bases.

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Characters of Female.—(Collison Ridge, Bath County, Virginia.) Size rather small, form more slender than in *uhleriana* or *fulvescens*, not as compact as in *bolliana*. Head broader and more evenly convex than in male. Interocular width slightly greater than that between antennal sockets. Minute ocellar spots present. Pronotum convex, without discal sulci, ample, with portion of greatest width near caudal margin, which is truncate, very weakly convex. Tegmina quadrate pads, with sutural margins slightly overlapping, extending slightly beyond caudal margin of median segment, rounding broadly at apex of anal vein and with the more broadly rounded angle at costal margin slightly the more produced, a slight emargination (normally[151]) indicated on the margin of the discoidal field; veins distinct. Wings represented by small atrophied pads, their apices extending slightly beyond the distal margin of the metanotum. Sixth dorsal abdominal segment with distal margin weakly and broadly convex in large mesal portion. Supra-anal plate decidedly more than twice as wide as long, lateral margins straight convergent,[152] from bases of cerci to acute, sharply rounded apex. Cerci shorter than in male, with lateral margins feebly crenate, joints distinct but dorsal surface subdeplanate. Subgenital plate convex, little produced, with free margin rather weakly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Cambridge, Massachusetts	(3)	13–13.9	3.1–3.2	3.7–3.9	15–15.1	4.8–5
West Point, New York	(2)	11.5–13.8	2.7–3.2	3.4–4.1	14.3–16.6	4.6–5.6
Ivy Hill, Pennsylvania	(9)	12.1–14.2	3–3.4	3.7–4.3	14.7–17	4.8–5.2
Washington, District of Columbia	(15)	11.7–13	3.1–3.3	3.8–4.3	13.8–15.7	4.6–4.7
Tappahannock, Virginia	(3)	11.8–12	3.1–3.2	3.8–3.8	14–13.7	4.6–4.1

[151] As in the other species showing this type of tegmina, the proportions show frequent slight individual variation. Sometimes an appreciable elongation, sometimes a distinct narrowing, is found. At the free margin of the discoidal field variation frequently occurs, ranging from no emargination whatsoever, to a decided concavity, which gives the tegmina a strongly truncate form. This latter condition is normal in *fulvescens* from the eastern United States, though occasional specimens from that region show only a slight emargination.

It is evident that, though eastern material of *virginica* and *fulvescens* is normally different in this feature, it can only be used as of secondary importance. Valid characters such as form, pronotal dimensions, production of the sixth dorsal abdominal segment and form of supra-anal plate must be used in separating females of these species. Failure to recognize this has resulted in Rehn and Hebard's incorrectly recording small females of *fulvescens*, unusual in tegminal contour, as *borealis*, a synonym of *virginica*, from Goldsboro, North Carolina and Mena, Arkansas.

[152] Occasional specimens show a very weak concavity of these margins.

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♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Asheville, North Carolina	(40)	12.7–13.7	2.8–3	3.7–4	14.4–15.8	4.7–4.9
Northern Illinois		14.7	3.4	4.3	16.7	5.7
St. Louis, Missouri		12.8	3	3.7	13.8	4.7
South Bend, Nebraska	(5)	13.8–15.4	3.3–3.6	4.1–4.4	14.3–15.8	4.9–5.2
Arkansas City, Kansas		11.7	2.9	3.6	12.8	4.3
♀						
Wollaston, Massachusetts		10.3	3.7	4.8	4.3	3.3
Ivy Hill, Pennsylvania	(51)	10.9–12.5	3.2–3.7	4.1–4.9	3.8–4.9	2.7–3.3
Washington, District of Columbia	(32)	10.3–11.7	3.3–3.6	4.–4.6	4–4.4	2.8–3.1
Rabun County, Georgia	(2)	10.5–11.4	3.3–3.3	4.2– —	3.3–3.7	2.8–2.9
Opelika, Alabama		10.3	3.2	4.4	3.7	2.8
Vigo County, Indiana	(2)	10.8–11.6	3.2–3.4	4.4–4.7	4–3.8	2.8–3
South Bend, Nebraska	(3)	10.4–11.5	3.6–3.8	4.5–4.7	3.9–4.6	2.8–3.2

Rather decided size differences are shown by the very extensive series before us, these in great part due to individual variation, though over certain regions somewhat different averages are found to occur. No differences of adequate value or constancy are found, however, to warrant the recognition of a geographic race.

The average number of heavy spines on the ventro-cephalic margins of the cephalic femora aid in distinguishing *virginica* from *fulvescens*, and in consequence we have made the following counts from one hundred females[153], from all portions of the series before us.

Number of Spines	2–4	3–3	3–4	4–4	4–5	4–6	5–5
Number of Specimens	3	5	9	64	15	2	2

Of these, 64 % have four spines on each limb, 81 % four or less, while 98 % have four or less on at least one of the limbs. The fifth or sixth distal, heavy spine, when present in this species, is usually much smaller than the others.

Coloration.— ♂. (Normal.) General coloration ochraceous-buff, with disk of pronotum slightly darker. Head tawny, eyes mummy brown, ocelli pale ochraceous-buff, mouth-parts ochraceous-buff.

[153] This sex of these species is alone liable to be confused. In the males the spine count agrees closely with that of the females.

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Tegmina transparent, ochraceous-buff, becoming paler distad. Wings hyaline, with area of costal veins and, to a less degree, distal portion of anterior field, washed with ochraceous-buff. Abdomen ochraceous-buff, washed with buckthorn brown or ochraceous-tawny, particularly distad. In rare specimens, showing maximum recessive coloration, the darker portions of the head are weak ochraceous-tawny and the pronotal disk is of the pale general coloration. In the maximum intensive coloration, the dark portions of the head are deep bay and nearly the entire anterior field of the wings are suffused with ochraceous-tawny.

♀. (Normal.) Head shining blackish chestnut brown, minute ocellar spots pale ochraceous-buff, mouthparts and also limbs ochraceous-tawny. Pronotum and tegmina hazel, the latter with marginal field slightly paler. Dorsal surface of abdomen shining dark chestnut brown, the segments washed more and more heavily proximad with hazel. Ventral surface of abdomen tawny. In rare specimens of maximum recessive coloration the head is tawny, the remaining portions of the insect ochraceous-tawny with underparts and limbs slightly paler. In the maximum intensive coloration, occasionally encountered, the head and dorsal surface of abdomen are shining blackish chestnut brown, the pronotum and tegmina shining suffused chestnut, the limbs pale tawny and ventral surface of abdomen chestnut brown. The majority of the specimens before us range from the normal toward the intensive color condition, no geographic significance being found.

The ootheca is small, usually distinctly less than three times as long as deep, and is carried with suture directed dorsad. Its surface is microscopically granulose with vertical divisions weakly indicated. The suture is supplied with minute, rather well spaced, conical knobs, arranged approximately one at the extremity of, and one intermediate between, each of the vertical divisions.

The range of the species is now known to extend northward on the Atlantic coast as far as Norway and Orono, Maine. South of these points it is widely distributed to the coast as far as the latitude of Lillington, North Carolina.[154] Farther southward it is found only in the Piedmont and numerous in the Appalachians to

[154] Males already recorded by Rehn and Hebard, as the synonymous *borealis*, from Fernandina, Florida, do indeed represent the present species, but it appears quite probable that these were wrongly labelled. Those authors' records of females from Goldsboro, North Carolina, and Mena, Arkansas, must be referred to *fulvescens*.

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their southern limit, having been secured as far southwestward as Opelika, Alabama. Westward the species is known as far as St. Anthony Park, Minnesota; Lincoln, Nebraska, and Clark County, Kansas; in the Mississippi valley region not being known south of Crawford County, Indiana, and St. Louis, Missouri.

Specimens Examined:[155] 637; 159 males, 475 females, 1 immature male and 2 immature females.

Orono, Maine, VII, 27, 1906, 1 ♀, [Maine State Agr. Exp. Sta.].
Norway, Me., (S. J. Smith), 1 ♂, [M. C. Z.].
Lowell, Massachusetts, VI, 17, 1879, 1 ♂, 1 ♀, [M. C. Z.].
North Wilmington, Mass., VI, 4, 1909, 1 ♀, [Morse Cln.].
Brookline, Mass., (Bond), 1 ♂, [M. C. Z.].
Jamaica Plains, Mass., VIII, 16, 1877, 1 ♀, [M. C. Z.].
Forest Hills, Mass., VIII, 22, 1877, 1 ♀, [M. C. Z.].
Cambridge, Mass., VI, 9 to VII, 9, 1871, 3 ♂, [M. C. Z.].
Wollaston, Mass., 1883, VI, 1 and 8, 1896, 1897, (F. H. Sprague), 3 ♂, 1 ♀, [M. C. Z.].
Milton, Mass., VI, 26, 1878, 1 ♂, [M. C. Z.].
Wellesley, Mass., VII, 16 to 27, 1904, 1914, (A. P. Morse), 4 ♀, [Morse Cln.].
Springfield, Mass., (Emery), 1 ♀, [M. C. Z.].
Hartland, Vermont, VIII, 10, 1912, 1 ♀, [Morse Cln.].
Waterbury, Connecticut, VI, 7, 1880, (W. H. Patton; at light), 1 ♂, [A. N. S. P.].
New Haven, Conn., (B. H. Walden), 1 ♂, 1 ♀, [Hebard Cln.].
Ithaca, New York, VI, 3, 1915, (W. T. Davis; in Coy Glen), 1 ♂, 1 ♀, [Davis Cln.].
Deep Pond, Wading River, Long Island, N. Y., VII, 26, 1914, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln. and Bklyn Inst.].
Yaphank, L. I., N. Y., VI, 9, 1912, (W. T. Davis), 1 ♂; IX, 5, 1911, (W. T. Davis), 1 ♀, [both Davis Cln.].
West Point, N. Y., (Osten Sacken), 1 ♂, [M. C. Z.]; VI, 14 and 16, 1913 and 1914, (W. T. Davis), 3 ♂, 4 ♀, [Davis Cln.].
Pine Island, N. Y., VI, 20, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].
Clove Valley, Staten Island, N. Y., VIII, 15, 1912, (W. T. Davis; at sugar), 4 ♀; VI, 5 and VIII, 1914, (W. T. Davis), 1 ♂, 2 ♀, [all Davis Cln.].
Newfoundland, New Jersey, V, 28, 1910, (W. T. Davis), 1 ♂, [Davis Cln.].
Bear Swamp, Ramapo Hills, N. J., VI, 20, 1910, (C. L. Pollard,) 1 ♀, [Davis Cln.].
Old Bridge, N. J., VI, (W. T. Davis), 1 ♀, [Davis Cln.].
Lakehurst, N. J., VII and VIII, 18, (W. T. Davis), 2 ♀, [Davis Cln.].
Chatsworth, N. J., VIII, 20, 1912, (W. T. Davis), 1 ♀, [Davis Cln.].

[155] So general has been the confusion of the names *borealis*, *uhleriana*, *unicolor* and *uhleriana fulvescens*, that it would be impossible to correct the past references for these, without examining the material upon which each was based.

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West Creek, N. J., VIII, 26 and 28, 1914, (Rehn; trapped, molasses jar in pine and oak woods), 2 ♀, [A. N. S. P.].

Eagleswood Bog near Stafford's Forge, Ocean County, N. J., VIII, 28, 1914, (Rehn), 1 ♀, [A. N. S. P.].

Cardiff, N. J., VII, 28 to 31, 1914, (Hebard; trapped, molasses jar in pine barrens), 1 ♀, [Hebard Cln.].

Reega, Atlantic County, N. J., VII, 20 to VIII, 20, 1914, (Hebard; trapped, molasses jar in area of pine barrens with heavy, grassy undergrowth), 32 ♀, [Hebard Cln.].

Peermont, N. J., VII, 13, 1907, 1 ♂, [A. N. S. P.].

Swainton, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jar in forest of few pines, indicating the southernmost extent of pine barrens), 13 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jar in oak forest), 38 ♀, [Hebard Cln.].

Dias Creek, N. J., VII, 20 to VIII, 8, 1914, (Hebard; trapped, molasses jar in oak woods), 79 ♀, [Hebard Cln.].

Westville, N. J., VI, 6, 1 ♂, [Hebard Cln.].

Clementon, N. J., VII, 2 to 30, 1914, (E. R. Casey; trapped, molasses jar), 21 ♀, [Casey Cln.].

Mount Pocono, Pennsylvania, VI, 9 to 19, 1906, (P. P. Calvert), 1 ♂, [A. N. S. P.].

Philadelphia, Pa., V, 26, 1 ♂; V, 29, 1906, 1 ♀; VI, 1 to 19, 1914, (Hebard; trapped, molasses jar in heavy ravine forest at Wissahickon and Lincoln Drives), 1 ♂, 2 ♀; VI, 10 to 15, 1914, (Hebard; trapped, molasses jar on rocky slope with few deciduous trees in Fairmount Park at Dauphin Street), 1 ♂, 3 ♀; VI, 12 to 30, 1914, (Hebard; trapped molasses jar on knoll with high deciduous trees on Lincoln Drive at Tulpehocken), 19 ♀, [all Hebard Cln.].

Ashbourne, Pa., VI, 30, 1907, (B. Long), 1 ♂, [A. N. S. P.].

Mount Airy, Pa., VI, 10 and 11, (P. Laurent), 2 ♂, 1 ♀, [Hebard Cln.].

Ivy Hill, Mount Airy, Pa., VI, 4, 1914, (Hebard; under bark of decaying chestnut log), 8 ♂, 4 ♀; VI, 8 to 30, 1914, (Hebard; trapped, molasses jar in lofty scattered chestnut forest), 1 ♂, 54 ♀, [all Hebard Cln.].

Upsal, Pa., VI, 14 to VII, 11, 1914, (Hebard; trapped, molasses jar in oak forest on high ground), 19 ♀, [Hebard Cln.].

Chestnut Hill, Pa., VI, 13, 1904, (Hebard; under stones in forest chiefly of chestnut), 3 ♀, 1 with ootheca; VI, 16 to 23, 1914, (Hebard; trapped, molasses jar near Wissahickon in heavy deciduous forest ravine), 2 ♀; X, 23, 1903, (Hebard; in deciduous forest), 1 juv. ♂, 1 juv. ♀, [all Hebard Cln.].

Whitemarsh, Pa., VI, 8 to VII, 17, 1914, (H; trapped, molasses jar in heavy low chestnut and oak forest on high ridge), 4 ♂, 84 ♀, [Hebard Cln.].

Harrisburg, Pa., VI, 13, (at light), 1 ♂, [Pa. State Dept. Zool.].

McConnellsburg, Pa., VI, 4, 1905, (W. Stone), 1 ♀, [A. N. S. P.].

Beatty, Pa., (O. Brugger), 4 ♂, 2 ♀, 1 juv. ♀, [A. N. S. P.].

Chestertown, Maryland, V, 30, 1910, (E. G. Vanatta), 1 ♂, [A. N. S. P.].

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Beltsville, Md., VI, 4, 1914, (J. D. Hood), 1 ♂, [U. S. N. M.].

Cabin John, Md., (A. N. Caudell), 1 ♂, [U. S. N. M.].

Glen Echo, Md., VII, 11, 1914, (A. N. Caudell), 1 ♀, with ootheca, [U. S. N. M.].

Washington, District of Columbia, V and VI, 3 ♂, [U. S. N. M. and Hebard Cln.]; VI, 2, 1903, (A. N. Caudell; bred), 6 ♂, [U. S. N. M.]; VI, 1910, (W. T. Davis; trapped), 35 ♀, [Davis Cln.].

Falls Church, Virginia, VI, 23 and 28, 1 ♂, 1 ♀, [U. S. N. M.].

Tappahannock, Va., VI, 9 and 17, 1915, (H. Fox), 2 ♂, [Fox Cln.].

Charlottesville, Va., VII, 14, 1914, (H. Fox), 1 ♂, [Fox Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; under bark of decayed chestnut stump, 1 adult, several juv.), 1 ♀; 2700 feet, VII, 5 to 14, 1916, (Hebard; trapped, molasses jar), 5 ♀, [all Hebard Cln.].

Boykins, Va., (C. W. Johnson), 1 ♂, [A. N. S. P.].

Lake Drummond, Dismal Swamp, Va., VI, 8 to 11, 1905, (H. S. Barber), 1 ♂, [U. S. N. M.].

Cumberland Gap, Kentucky, (G. Dimmock), 1 ♂, [M. C. Z.].

Sulphur Springs, Buncombe County, North Carolina, 2500 feet, V, 6 to VI, 13, 1904 and 1906, (Hebard; at light), 40 ♂, [Hebard Cln. and A. N. S. P.].

Black Mountains, N. C., V, 20 to IX, 15, 1912, (W. Beutenmüller), 14 ♂, [Cornell Univ. Cln.].

Tryon, N. C., (W. F. Fiske), 1 ♂, [Hebard Cln.].

Lillington, Harnet County, N. C., VI, 28, 1904, (C. S. Brimley; under log in wet place in wood), 1 ♀, with ootheca, [Hebard Cln.].

Clayton, Georgia, 2000 to 3700 feet, VI, 1909, (W. T. Davis), 1 ♀, [Davis Cln.].

Rabun County, Ga., VII, 1910, (W. T. Davis; trapped), 3 ♀, [A. N. S. P. and Hebard Cln.].

Fernandina, Florida, 1 ♂, [A. N. S. P.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps with females of *I. uhleriana* and *I. divisa*), 1 ♀, [Hebard Cln.].

Lake County, Indiana, (W. S. Blatchley), 1 ♂, [Blatchley Cln.].

Marion County, Ind., V, 10, 1896 and 1897, (W. S. Blatchley), 1 ♂, 1 ♀, [Hebard Cln. and M. C. Z.]; VI, 4, 1897, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Crawford County, Ind., V, 26 and 27, 1896 and 1904, (W. S. Blatchley), 1 ♂, 1 ♀, [Hebard Cln.]; VI, 27, 1902, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Vigo County, Ind., VI, 18, 1894, (S. S. Hill), 1 ♀, [Hebard Cln.]; 1 ♀, [M. C. Z.]; (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Terre Haute, Ind., VI, 12, 1892, (W. S. Blatchley; at electric light), 1 ♂, [Blatchley Cln.].

Lawrence County, Ind., VII, 16, 1902, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Clarke County, Ind., VII, 22, 1904, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Madison, Wisconsin, VI, 4 to 30, 6 ♂, [Wis. Agr. Exp. Sta. Cln.].

Dodgeville, Wis., VI, 10 and 11, 1914, (at light), 3 ♂, [Wis. Agr. Exp. Sta. Cln.].

Lancaster, Wis., VI, 8, 1914, (at light), 1 ♂, [Wis. Agr. Exp. Sta. Cln.].

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Cranmoor, Wis., (C. W. Hooker), 1 ♂, [U. S. N. M.].
Northern Illinois, 1 ♂, [Hebard Cln.].
Rock Island, Ill., (Walsh), 1 ♂, [M. C. Z.].
St. Louis, Missouri, VI, 15, 1904, (W. V. Warner), 1 ♂, [U. S. N. M.].
St. Anthony Park, Minnesota, VI, 4, 1899, 1 ♂, [Minn. Dept. Agr. Cln.].
South Bend, Nebraska, (L. Bruner), 5 ♂, 3 ♀, [Hebard Cln.].
Ashland, Nebr., 1 ♂, [Hebard Cln.].
Lincoln, Nebr., VI, 3 ♂, [Hebard Cln.].
Nebraska City, Nebr., VI, 5 ♂, 1 ♀, [Hebard Cln.].
Osage, Kansas, (Stolley), 1 ♂, [M. C. Z.].
Arkansas City, Ks., (A. N. Caudell), 1 ♂, [U. S. N. M.].

Parcoblatta uhleriana (Saussure) (Plate IV, figures 6 to 12.)

1862. *I[schnoptera] uhleriana* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 169. (April.) [♂, Pennsylvania.[156]]
1862. *P[latamodes] unicolor*[157] Scudder, Bost. Journ. Nat. Hist., vii, p. 417. (November.) [6 ♂, Massachusetts.]
1862. *E[ctobia] lithophila* Scudder, Ibid., p. 418. [juv., Massachusetts.]
1903. *Ischnoptera intricata* Blatchley, Orth. of Indiana, p. 186, fig. 28. (In part.) [♀: Crawford and Steuben Counties, Indiana.[158]]

Coincidence in time resulted in Scudder's synonym *unicolor*,[159] while his synonymous *lithophila* is attributable to the ill-advised description of immature material. Failure to associate the sexes resulted in the description of the female as *intricata*, since which time that sex of the present species has been without exception recorded under that name, or, due to further incorrect association, as the female of *I. johnsoni*.

Males of this species have been generally confused with those of *P. fulvescens* and *P. virginica* (as the synonymous *I. borealis*). Compared with *fulvescens* close similarity is found in size, general

[156] Taken by the describer.

[157] The records of subsequent authors of *Ischnoptera unicolor*, with two exceptions, apply properly either to males of *virginica*, or to material of that species and males of the present insect, in which case the presence of two distinct species was overlooked. The exceptions are of Floridian material, recorded by Scudder and Blatchley, representing males of *P. fulvescens*.

[158] We here select as single type of *Ischnoptera intricata* Blatchley: figured ♀; Crawford County, Indiana, VII, 2, 1902, (W. S. Blatchley), [Blatchley Cln.]. The male described as this species, with some doubt, by Blatchley, is also before us. It is a specimen of *Ischnoptera deropeltiformis* Brunner, which, killed when recently matured, had not attained its full coloration.

[159] Scudder has given twice the correct length measurements in his description.

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coloration, specialization of median segment and form of supra-anal and subgenital plates. In *uhleriana*, however, the head is normally more flattened between the eyes and ocelli and darkened medio-longitudinally; the pronotum is proportionately shorter, with point of greatest width normally mesad and the curvature of the cephalic and caudal angles more nearly similar, while the discal sulci are more pronounced; the tegmina are distinctly broader; the ridges of the median segment more decided, and the subgenital plate, at the base of the dextral style, not decidedly elevated. The cerci are extremely distinctive in having the inner distal angles of the sixth to ninth joints acutely, though weakly, produced and in consequence differing appreciably from the corresponding outer angles, a feature not found constant in any other known species of the genus.[160]

The female sex is distinctive,[161] particularly in the tegmina, which are lateral, but broadly and roundly subtriangular, while vestigial wings are present. Confusion can consequently occur only with the female of *P. desertae*, which is a more slender insect, with interocular space wider, tegmina decidedly narrower, with sutural margins less convex, mesal production of sixth dorsal abdominal segment distinctly less broadly rounded, and distinctively shaped supra-anal plate.

The highly specialized ootheca of the present species is of an entirely different type from that known for any other species of the genus.

Characters of Male.—(Whitemarsh, Pennsylvania.) Size medium for the genus, form moderately slender. Interocular space two-thirds (to slightly less than[162]) the width between the antennal sockets.[163] Ocelli well defined. Inter-ocular-ocellar area appreciably flattened to a point just above the antennal sockets, with surface microscopically roughened. Maxillary palpi more elongate than in *P.*

[160] A production of the distal cercal joints is found in *pensylvanica*. Though occurring in both sexes of that species, it is found to be individually extremely variable and of no diagnostic importance.

[161] The females referred by Rehn and Hebard in their Revision to *uhleriana*, are here properly referred to *fulvescens*; at that time no differences could be found between the females of these supposed geographic races. The confusion arose from the incorrect placing of the female of *uhleriana* as that sex of *johnsoni* (= *Ischnoptera deropeltiformis*).

[162] The variation in this dimension is similar to that found in *virginica*, see footnote 144.

[163] In the series slightly less than, to slightly more than, the interocellar width.

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bolliana, third joint slightly longer than fourth or fifth joints, which latter are (normally) subequal in length. Pronotum with greatest width at mesal point,[164] with angles of cephalic and caudal margins (normally) showing a similar curvature; oblique sulci of disk very decided and as in *virginica*. Tegmina and wings much as in *virginica;* wings (in the series) with two to six incomplete and five to eight complete rami of the ulnar vein. Median segment supplied mesad with two weakly arcuate, moderately raised ridges, which are weakly convergent cephalad, with brief cephalic faces each supplied with a heavy tuft of hairs, the surface of the segment is further supplied with minute scattered hairs cephalad of these ridges. Other dorsal segments unspecialized, distal margin of sixth segment showing very feeble, lateral, broad concavities and a very feeble, broad convexity mesad. Supra-anal plate about twice as broad as long, free margin embracing bases of cerci, very weakly convex about them, thence nearly straight, convergent to broadly rounded apex; surface of plate convex above cerci, evenly deplanate and declivent distad in remaining principal portion. Cerci slender, with (normally) eleven joints, decreasing evenly in size distad, the sixth to ninth joints with inner distal angles acutely but briefly produced.[165] Genital hook situated sinistrad, a chitinous process recurved at decidedly less than a right-angle, moderately elongate, with recurved portion well broadened; mesad and adjacent is situated a very elongate process, with distal chitinous portion aciculate and curved weakly sinistrad. Subgenital plate with surface moderately convex, except toward bases of styles, where it is moderately concave; lateral margins weakly convex and very weakly convergent in proximal half, very weakly concave and more strongly convergent in distal half, the concavity slightly greater, but its extent distinctly less, on the dextral margin, remaining distal portion of free margin nearly transverse, very weakly concave and slightly oblique, due to the slightly greater sinistral production of the plate: simple, slender styles, similar in size and form, situated at the rounded disto-lateral angles of the plate, in sockets on the ventral surface, in length (normally) each equal to about half the distance between their bases. Exposed portion of eighth dorsal abdominal segment, which is folded over the base of the subgenital plate, decidedly short, no longer than exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Whitemarsh, Pennsylvania.) Size medium, form broad. Head broader and more evenly convex than in male. Interocular width slightly greater than that between antennal sockets. Minute ocellar spots present. Pronotum moderately convex, without discal sulci, ample, with point of greatest width near caudal margin, which is truncate, very weakly convex; the lateral margins

[164] Rarely individuals show a condition more nearly as in *fulvescens*, with point of greatest width slightly more caudad; due to a weaker convexity of the caudal margin of the pronotum, or to a slight broadening of the curve of the lateral angles of its cephalic margin.

[165] In occasional specimens the degree of production of these angles shows slight differences. In but one, of the two hundred and twenty-nine males before us, could the cercal structure be confused with the simple type found in *fulvescens*, this character being one of the most useful in separating the males of these two species.

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cephalad (normally) feebly more convex than in *virginica*. Tegmina rounded, subtriangular, lateral pads, with sutural margins (normally) separated by slightly over 1 mm.,[166] extending slightly beyond caudal margin of median segment,[167] sutural margins rather strongly convex to rather broadly rounded distal angle, which is situated at the moderately convex costal margin; veins distinct but not prominent. Wings represented by very small atrophied pads, their apices extending (normally) slightly beyond caudal margin of metanotum.[168] Sixth dorsal abdominal segment with distal margin distinctly, but broadly, convex in large mesal portion. Supra-anal plate distinctly more than twice as broad as long, lateral margins weakly concave and convergent from bases of cerci to rather broadly rounded apex. Cerci shorter than in male, with lateral margins nearly entire,[169] with joints distinct and dorsal surface very feebly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum[170]	Length of tegmen[171]	Width of tegmen
Wollaston, Massachusetts	(2)	13.7–13.5	2.9–2.9	4.1–4.3	16.3–16.4	5.6–5.4
Whitemarsh, Pennsylvania	(27)	16–16.5	3.1–3.3	4.3–4.9	16.1–17.7	5.3–5.8
Washington, District of Columbia	(9)	13.7–15.5	3.1–3.2	4.3–4.7	15.7–17	5–6
Raleigh, North Carolina	(7)	15–17	3.3–3.4	4.8–4.9	16.7–17.9	5.8–6.1
Asheville, North Carolina	(68)	15–17	3.1–3.4	4.4–5	17.3–18.7	5.7–6.3
Clayton, Georgia	(2)	15.5–15.7	3.4–3.6	4.8–4.8	18.7–18.8	5.8–5.9
Mossville, Illinois		15	3.4	4.7	17.2	5.7
St. Louis, Missouri	(4)	13.3–16.5	3–3.6	4.3–4.7	16–17.7	5.3–5.9
Iowa City, Iowa	(2)	15.5–15	3.2–3.3	4.3–4.7	16.4–17.4	5.4–5.9

[166] Rare specimens show slightly less separation, while this dimension varies individually to nearly 2 mm. in certain specimens.

[167] The large series of females before us, shows decided variation in the tegminal length. Frequent specimens have the tegmina extending only to the caudal margin of the metanotum, while in rare examples these organs extend nearly to the caudal margin of the first abdominal segment.

[168] In individuals showing variation in tegminal size, a proportionate variation in the wing pads is found.

[169] Normally showing an extremely feeble crenation meso-distad.

[170] The pronotal width is given as accurately as possible under the conditions here found. The pronotum is usually somewhat distorted in trapped material, abnormally buckled up, while in papered material it is sometimes more flattened out than in life.

[171] The length of the exposed portion of the tegmen is given for females.

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♀		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Sherborn, Massachusetts	(2)	12–13.3	3.7–4.2	5.3–6	3.5–3.9	2.9–3.3
Whitemarsh, Pennsylvania	(383)	11.7–15	3.4–4.1	4.9–5.9	3.2–6.3[172]	2.7–3.7
Washington, District of Columbia	(123)	11.7–13	3.7–3.9	5–5.4	3–4.6	2.8–3.3
Asheville, North Carolina		—	3.9	5.7	4.2	3.2
Clayton, Georgia		11	3.9	5.3	3.7	2.8
St. Simon's Is., Georgia		12.3	3.8	5.6	3.4	3.2
Opelika, Alabama		9.8	3.5	4.8	3.2	2.5
Crawford Co., Indiana	(2)	11.9–12.7	3.6–3.7	5.7–5.3	3.8–4.2	3.2–3
Mountain Grove, Missouri	(11)	11.5–14	3.8–4.2	5.4–5.9	3.7–4.3	3.1–3.2
Bloomington, Iowa		11	3.8	5.5	4	3.3

The very large series of females before us shows interesting variations in the tegmina. Slight variation in size is frequent, while the margin of the discoidal field is sometimes nearly straight, or often shows varying degrees of weak concavity.

The optimum of the present species is apparently found in the southern Appalachians; little geographic variation, however, is apparent.

The number of heavy spines on the ventro-cephalic margins of the cephalic femora is variable, and of no diagnostic value in the majority of the species of the genus. The following count, for one hundred specimens of each sex of the present species, shows the great instability here found.

Number of Spines	2-5	3-3	3-4	3-6	4-4	4-5	4-6	5-5	5-6	5-7	6-6	6-7	6-8	6-9	1-4
Number of Males	0	2	4	1	9	25	4	26	15	1	7	3	1	1	1
Number of Females	1	3	8	0	9	30	1	30	16	0	1	1	0	0	0

Counts made for other species, but not included in the present paper, show considerable variability in each, but, as in the present species, show a count of from four to six of these spines on each cephalic femur in a large majority of the specimens.

[172] Two specimens, in this series alone, of the nine hundred and seventy-two females before us, show this very unusual tegminal length. The extreme distal production in both is found only in the costal field. The average tegminal length for females of *uhleriana* is 3.5 to 4 mm.

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Coloration.—♂. (Normal.) General coloration ochraceous-buff with disk of pronotum and tegmina slightly darker, tinged with ochraceous-tawny. Head tawny, shading laterad to ochraceous-buff at the antennal sockets and genae; eyes blackish brown; ocelli pale ochraceous-buff. Tegmina transparent. Wings hyaline, faintly tinged with ochraceous-tawny, this slightly heavier distad in the anterior field and decidedly heavier, as heavy as on the tegmina, in the costal area. Abdomen ochraceous-buff, washed with ochraceous-tawny distad. In specimens of maximum recessive coloration, the ochraceous-tawny is everywhere more dilute, the vertical cephalic marking, however, never disappearing. In the intensive extreme this marking is tawny above, but mars brown below the ventral margin of the eyes; the tegmina being deep russet, with the exception of the marginal field, which is weak ochraceous-tawny.

♀. (Maximum recessive.) Head, pronotum, mesonotum and metanotum ferruginous, the former slightly paler on the genae, the latter narrowly margined with blackish brown caudad. Tegmina kaiser brown, with marginal field ferruginous. Dorsum of abdomen blackish brown, with numerous segments narrowly bordered proximo-laterad with ferruginous. Eyes blackish brown. Minute ocellar dots cream color. Limbs ochraceous-tawny proximad, deepening to tawny at the tibiae. Ventral surface of abdomen kaiser brown, each segment broadly marked with blackish chestnut laterad. From this condition to the maximum intensive type of coloration every gradation and variation is found, the majority of even the paler specimens having, however, the abdomen solidly blackish brown above and below. Rarely pale specimens, having the pronotum ferruginous, have the tegmina, excepting the marginal field, blackish brown, this color occasionally briefly invading the pronotum latero-caudad. This particular condition is strikingly handsome. (Maximum intensive.) General color shining blackish brown, the trochanters and tarsal joints russet. Minute ocellar dots whitish. Often specimens of intensive coloration have the tegmina, and occasionally the pronotum and limbs, slightly paler, blackish chestnut brown, but a multitude of variations occur. One striking type is above entirely blackish brown, except the marginal fields of the tegmina, which are tawny.

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The young of both sexes before us are dark in general coloration, further resembling the adult female in cephalic contour.

The remarkable ootheca is carried with suture laterad. It is similar in form to that of *P. fulvescens*, approximately 3.4 mm. in width, with surface microscopically very finely granulate, and vertical divisions weakly defined and moderately well spaced, as in that species. The suture is furnished with minute, regularly and moderately well-spaced, acute-conical projections, as in *fulvescens*, but along each side runs a deeply inset, oval channel, almost closed above by the thin wall projecting from the base of the suture and the lateral surface of the ootheca (see Pl. IV, figs. 11 and 12). This condition is not found in any other species of the genus, for which the ootheca is known.

It is of interest to note that at Whitemarsh, Pennsylvania, in a low but heavy chestnut, oak and maple forest, where molasses traps showed the species to be present in great numbers, search for several hours at various times, on the ground in leaves and leaf mould, under stones and under the bark of decaying chestnut logs, failed to reveal a single specimen of the insect.

The known northern limits of the species are: the vicinity of Boston, Massachusetts; Saginaw Bay, Michigan, and Iowa City, Iowa. On the immediate Atlantic coast it has been found as far south as Pablo Beach, Florida, but has not been recorded from the Coastal Plain or Piedmont Plateau south of Raleigh, North Carolina. It is distributed to the southernmost limits of the Appalachians, and has been taken as far southwestward of that point as Opelika, Alabama. Its southwestward distribution is imperfectly understood, owing to insufficiency of material, the known limital records being Nashville, Tennessee and Mountain Grove, Missouri.

Specimens Examined: 1245; 238 males, 994 females, 13 immature individuals.

Massachusetts, 1 juv. ♂, 1 small juv., *cotypes* of *Ectobia lithophila* Scudder; 1 ♂, *type* of *Platamodes unicolor* Scudder, [all M. C. Z.].

Wellesley, Mass., VII, 16 to VIII, 1902 to 1914, (A. P. Morse), 1 ♂, 5 ♀, [Morse Cln.].

Sherborn, Mass., (E. J. Smith; light trap), 4 ♂; VIII, 1896 and 1910, 2 ♀, 1 with ootheca, [Morse Cln.].

Milton, Mass., VI, 26, 1878, 1 ♀, [M. C. Z.].

Wollaston, Mass., (F. H. Sprague), 2 ♂, [M. C. Z.].

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Sharon, Mass., VIII, 22, 1897, (F. H. Sprague), 1 ♀, [M. C. Z.].

Edgartown, Martha's Vineyard, Mass., VI, 28, 1 ♀, [Bost. Soc. Nat. Hist. Cln.].

Lyme, Connecticut, VII, 3, 1910, (A. B. Champlain), 1 ♀, [Morse Cln.].

New Haven, Conn., VI, 14 and 19, 1910, (B. H. Walden), 2 ♂, 2 ♀, [Morse and Hebard Clns.].

Wading River, Long Island, New York, V, 30, 1914, (W. T. Davis), 1 ♂; VII, 26, 1914, (W. T. Davis; at Deep Pond), 2 ♀, [all Davis Cln.].

West Point, N. Y., (Osten-Sacken), 1 ♂, [M. C. Z.]; VI, 18, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Staten Island, N. Y., V, 22 to VIII, (W. T. Davis), 3 ♂, 5 ♀, [Davis Cln.].

Ramsey, New Jersey, VI, 24, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Lakehurst, N. J., V, 27 to VII, (W. T. Davis), 3 ♂, 1 ♀, [Davis Cln. and Bklyn. Inst.]; VII, 27, 1915, (Rehn; in pine barrens), 1 ♀, [A. N. S. P.].

Eagleswood Bog near Stafford's Forge, N. J., VIII, 26 to 30, 1914, (Rehn; trapped, molasses jar), 2 ♀, 1 juv. ♀, [A. N. S. P.].

West Creek, N. J., VIII, 26 and 30, 1914, (Rehn; trapped, molasses jar in oak and pine woods), 1 ♀, 1 juv. ♂, [A. N. S. P.].

Margate City, N. J., VII, 24 to VIII, 16, 1914, (Hebard; trapped, molasses jars in heavy barrier beach forest), 1 ♂, 58 ♀, [Hebard Cln.].

Mount Calvary at Pleasantville, N. J., VII, 25 to 27, 1914, (Hebard; trapped, molasses jar in scant pine barrens undergrowth), 1 ♀, [Hebard Cln.].

Cardiff, N. J., VII, 25 to VIII, 10, 1914, (Hebard; trapped, molasses jars in typical pine barrens undergrowth), 7 ♀, [Hebard Cln.].

Reega, N. J., VII, 20 to VIII, 10, 1914, (Hebard; trapped, molasses jars in pine barrens, with heavy, grassy undergrowth), 72 ♀, [Hebard Cln.].

Swainton, N. J., VII, 20 to VIII, 21, 1914, (Hebard; trapped, molasses jars on border of pine barrens and on edge of swamp), 35 ♀, 1 very small juv., [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 21, 1914, (Hebard; trapped, molasses jars in heavy deciduous forest), 92 ♀, [Hebard Cln.].

Dias Creek, N. J., VII, 27 to VIII, 8, 1914, (Hebard; trapped, molasses jars in heavy oak woods), 99 ♀, 3 very small juv., [Hebard Cln.].

Clementon, N. J., VII, 2 to 31, 1915, (E. R. Casey; trapped, molasses jars), 20 ♀, [Casey Cln.].

Haddonfield, N. J., II, 1, 1889, 1 ♀, [A. N. S. P.].

Ashbourne, Pennsylvania, VI, 17, 1912, (B. Long), 1 ♂, [A. N. S. P.].

Tulpehocken, Pa., VI, 20 to 22, 1914, (Hebard; trapped, molasses jar), 1 ♂, [Hebard Cln.].

Upsal, Pa., VI, 14 to VII, 11, 1914, (Hebard; trapped, molasses jars in upland oak and chestnut forest), 22 ♀, [Hebard Cln.].

Ivy Hill, Mount Airy, Pa., VI, 8 to 30, 1914, (Hebard; trapped, molasses jars in chestnut forest), 2 ♂, [Hebard Cln.].

Chestnut Hill, Pa., VI, 12 to 15, 1914, (Hebard; trapped, molasses jar in Wissahickon forested ravine), 1 ♂, [Hebard Cln.].

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Whitemarsh, Pa., VI, 15 to VII, 11, 1914, (Hebard; trapped, molasses jars on ridge with heavy oak, chestnut and maple forest), 27 ♂, 383 ♀, 1 ootheca, [Hebard Cln.].

Valley Forge, Pa., VII, 2, 1915, (Hebard; in decayed log), 1 ♀, [Hebard Cln.].

Ridley Township, Delaware County, Pa., VI, 4, 1897, 1 ♂, [A. N. S. P.].

Dauphin, Pa., VII, 4, 1 ♀, [Pa. State Dept. Zool. Cln.].

Delaware, 3 ♂, [A. N. S. P.].

Chestertown, Maryland, VIII, 19, 1899, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

Forest Glen, Md., VI, 21, 1914, (Mrs. Heidemann), 1 ♂, [U. S. N. M.].

Silver Springs, Md., 1 ♂, [U. S. N. M.].

Plummer's Island, Md., V, 24 to VIII, 27, 1906 to 1914, (Shannon, Barber, Hood, Fisher), 6 ♂, 12 ♀,[173] [U. S. N. M.].

High Island, Md., VII, 1, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Washington, District of Columbia, VI, 1910, (W. T. Davis), 61 ♂, 122 ♀, 1 juv. ♂ and 1 juv. ♀, [Davis Cln.]; VI, 19, (F. Knab), 1 ♀, [U. S. N. M.]; VII, 12, 1912, (A. N. Caudell), 1 ♂, [U. S. N. M.].

Alexandria County, Virginia, VI, 1914, (W. T. Davis), 1 ♂, 1 ♀, 1 juv. ♂, 1 juv. ♀, [Davis Cln.].

Arlington, Va., VII, 9, 1914, (Hebard; at night in forest), 1 ♂, [Hebard Cln.].

Fairfax County, Va., VI, 22, 1914, (W. T. Davis), 1 ♀, [Davis Cln.].

Falls Church, Va., VI, 26, (P. B. Rohwer), 1 ♂; X, 6, 1 ♀, [both U. S. N. M.].

Chain Bridge, Va., VI, 9, 1905, (A. N. Caudell), 1 ♀, [Univ. of Kansas Cln.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard; under damp leaves on edge of forest), 3 ♀, [Hebard Cln. and A. N. S. P.].

Tappahannock, Va., VI, 8 and 17, 1915 and 1916, (H. Fox), 4 ♂, [Fox and Hebbard Clns.].

Charlottesville, Va., VI, 5 and 15, 1914, (H. Fox), 2 ♂, [Fox Cln.].

Deer Lick Mountain, Bath County, Va., 2800 feet, VII, 10, 1916, (Hebard; under bark of decayed chestnut log), 1 ootheca, [Hebard Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 8 to 14, 1916, (Hebard; trapped, molasses jar), 5 ♀; 3000 feet, VII, 14, 1916, (Hebard; in decaying chestnut log with *Cryptocercus punctulatus*), 1 ♀, [all Hebard Cln.].

Raleigh, North Carolina, VI, 1 to 13, 1904, (C. S. Brimley; attracted to light and under bark), 7 ♂, [Hebard Cln.].

Black Mountains, N. C., V, 20 to VII, 15, 1912, (W. Beutenmüller), 10 ♂, [Cornell Univ. Cln.].

Sulphur Springs, Buncombe County, N. C., V, 8 to VI, 13, 1904 to 1906, (Hebard; males attracted to light, female in dead leaves in forest), 68 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Rabun County, Georgia, VII, 1910, (W. T. Davis), 1 ♀, [Hebard Cln.].

[173] One of these males, taken by Barber, was captured while fluttering about one of these females. Females were taken on both dates given above; it would appear that this sex outlives the males by a considerable period, a feature also indicated by the dates of material of other species of the genus here studied.

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Clayton, Ga., 2000 to 3700 feet, VI and VII, 1909 and 1910, (W. T. Davis), 2 ♂, 1 ♀, [Davis Cln. and A. N. S. P.].

St. Simon's Island, Ga., VIII, 30, 1911, (Rehn and Hebard; dry leaves under live oaks), 1 ♀, [Hebard Cln.].

Pablo Beach, Florida, VIII, 11, 1905, (Rehn and Hebard; under palmetto root), 1 ♀, [Hebard Cln.]

Crawford County, Indiana, VII, 2, 1902, (W. S. Blatchley), 3 ♀, *type* and *paratypes* of *I. intricata* Blatchley, [Blatchley Cln. and U. S. N. M.].

Mossville, Illinois, V, 1889, (F. Blake), 1 ♂, [M. C. Z.].

Nashville, Tennessee, 1 ♀, [Hebard Cln.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps with females of *P. virginica* and *P. divisa*), 1 ♀, [Hebard Cln.].

Iowa City, Iowa, IV, 24, 1909 and VI, 12, 1915, (M. P. Somes), 2 ♂, [Somes Cln.].

Bloomsboro, Ia., VII, 1867, 1 ♀, [M. C. Z.].

St. Louis, Missouri, V, 14 to VI, 1904, (W. V. Warner; 1 at light), 4 ♂, [U. S. N. M.].

Mountain Grove, Mo., V, 26 to VI, 28, 1914 and 1916, (M. P. Somes; all but 2 ♂ trapped, molasses jar), 9 ♂, 11 ♀, 1 juv. ♂; VII, 29 to VIII, 14, 1916, (for Somes; trapped, molasses jar), 4 ♀, [all Somes Cln.].

Parcoblatta fulvescens (Saussure and Zehntner) (Plate IV, figures 13 to 16).

1893. *Ischnoptera uhleri* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, pl. III, fig. 23. (Lapsus pro *uhleriana*.)[174]

1893. [*Ischnoptera uhleriana*] [variety] *fulvescens* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 36, pl. III, fig. 23. [♂: Georgia; Texas, and New Mexico (in part).][175]

1893. *Temnopteryx texensis* Saussure and Zehntner, ibid., p. 52, pl. III, fig. 31. [♀; New Mexico and Texas.]

Failure to associate the sexes of this species resulted in the above synonymy. Saussure and Zehntner further incorrectly supposed the female of *P. zebra* to represent that sex of typical *uhleriana*, a species not in the material before them at that time.[176]

[174] Though an evident lapsus calami (as indicated in the same volume by Saussure and Zehntner, in 1900, in their list of plates, p. VII), and as the figures apply to two species, we here fix as type of *uhleri* the male figured, and the name *uhleri* accordingly falls in the synonymy under *fulvescens*, as that same specimen we here designate type of *fulvescens*. See next footnote.

[175] Both the description and the plate give no indication of the exact locality, from which came the male described as *uhleriana* var. *fulvescens*. The material treated as "*uhleriana*" is listed as from Georgia, Texas and New Mexico. Among these specimens, the described and figured female unquestionably represents *P. zebra*.

[176] This species has been frequently confused with *uhleriana*. Since 1910, Rehn and Hebard have, with few exceptions, quoted material of the present species as *uhleriana fulvescens*. The Arizona records of *uhleriana* and *uhleriana fulvescens* all apply to *notha*.

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Males of this species agree with those of *P. uhleriana* in the type of specialization of the median segment, the ridges there found, however, being normally less pronounced in the present insect. The males of these species, which show some general similarity, are compared under *uhleriana*. The sharply rounded elevation of the inner surface of the subgenital plate at the base of the dextral style, which occurs in the present insect, is not found in any other species of the genus, but this feature shows occasional individual variation in males from the southeastern United States, and in those before us from Texas is very weakly indicated.

The females could only be confused with those of *P. virginica* and *P. lata*. Females of the former are smaller[177]; of the latter, much larger, more robust, with pronotum more transverse, and truncation of tegmina almost always commencing on the sutural margin distinctly beyond the apex of the anal area.

Characters of Male.—(Thomasville, Georgia.) Size medium for the genus; form moderately slender. Interocular space intermediate in width to that between the ocelli and that separating the antennal sockets, wider than is normal in *uhleriana* and showing (in the series) less variability than in that species. Ocelli well defined. Area between eyes and ocelli (normally) showing a weak flattening, not as decided as in *uhleriana*, with a few minute punctae. Maxillary palpi much as in *uhleriana*, but with third and fifth joints subequal in length, each slightly longer than fourth joint. Pronotum (normally) with greatest width slightly caudad of mesal point, with cephalic angles more broadly rounded than caudal angle,[178] oblique sulci of disk weakly defined. Tegmina and wings normal, fully developed; tegmina proportionately narrower than in *uhleriana*; wings (in the series) with one to four incomplete and four to six complete rami of the ulnar vein. Medium segment supplied mesad with two weakly arcuate, feebly raised ridges, which are convergent cephalad, with brief cephalic faces each supplied with a heavy tuft of hairs, the surface of the segment is also supplied cephalad of these ridges with minute, scattered hairs. Other dorsal segments unspecialized, distal margin of sixth segment as in *uhleriana*. Supra-anal plate much as in *uhleriana*, but with surface feebly convex above cerci, declivent distad, the produced distal portion slightly the more declivent, thus showing a feeble, weakly convex, delimiting ridge between the cerci. Cerci slender, with (normally) eleven joints. Genital hook situated sinistrad, a

[177] Full comparison is made under *virginica*.

[178] Rare specimens have these angles similarly rounded, as is normal in *uhleriana*. Other individuals occasionally have the oblique sulci of the pronotal disk unusually pronounced, as in that species.

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chitinous process recurved at decidedly less than a right-angle, moderately elongate, with recurved portion very slender and little wider than at point of recurvature. Dextrad and immediately adjacent is situated a straight, very slender process, with chitinous apex aciculate and curved weakly dextrad. Subgenital plate with surface feebly convex, lateral margins more convex and convergent than in *uhleriana*, to weak concavities before styles, but with general character and also sinistral style as in that species. Dextral style situated in a socket above the caudal margin of the plate, this socket placed on the caudal surface of a sharply rounded, rather elongate, knob-like projection of the dorsal surface on the plate.[179]

Characters of Female.—(Spring Creek, Georgia.) Very similar to *uhleriana* in size, form and shape of head. Interocular width very slightly greater than that between antennal sockets. Very small ocellar spots present. Pronotum moderately convex, without discal sulci, ample, with greatest width near caudal margin, which is truncate, very weakly convex. Tegmina subquadrate, with sutural margins feebly overlapping, truncation at apex of anal vein (normally) showing a weak concavity in the discoidal field, weakly oblique so that the (normally) rather sharply rounded angle at the costal margin is slightly the more produced.[180] Wings much as in *virginica*. Sixth dorsal abdominal segment with distal margin (normally) concave laterad, convex in broad mesal portion.[181] Supra-anal plate, cerci and subgenital plate much as in *uhleriana*.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen[182]	Width of tegmen
Arlington, Virginia....		13.7	3.3	4.7	16.3	4.8
Raleigh, North Carolina.....	(3)	16–15.7	3.6–3.7	4.8–4.9	16–17.5	5–5.3
Southern Pines, North Carolina.....	(9)	16–16.5	3.3–3.9	4.3–5	15.2–18.2	4.9–5.6
Sanford, Florida.....	(6)	12.5–13.5	3.3–3.6	4.7–4.8	14–15.3	4.7–4.8
Fort Lauderdale, Florida		15.7	4	5.2	16.7	5.7
Cocoanut Grove, Florida		14.5	3.7	4.5	14.3	4.6
Gulfport, Mississippi..	(2)	14–14.5	3.6–3.6	4.7–4.8	14.7–15	4.7–4.6
San Antonio, Texas....		15	3.8	5.2	16.4	5

[179] The variation found in this projection is discussed above. Both supra-anal and subgenital plates also show frequent minor irregularities of outline.

[180] Variation occurs to a type in which the caudal margin of the tegmen is broadly and evenly rounded, with angle at costal margin, in consequence, broadly rounded. This condition is rarely found in eastern material, but is the normal type in the Texan females (Pl. IV, fig. 16), a few of these, however, showing a feeble emargination in the discoidal field.

[181] This production varies frequently in degree and is occasionally rounded sub-trigonal.

[182] The length of the exposed portion of the tegmen is given for females.

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♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Victoria, Texas.....	(2)	13.3–14.6	3.3–3.9	4.7–5.3	14.7–16.2	4.3–5.1
Brownsville, Texas....		14	3.6	4.9	14.4	4.6
♀						
Wading River, New York.....		11	3.8	5.3	3.8	3.6
Cardiff, New Jersey...	(5)	13.5–14	4–4.6	5.5–6.1	4.8–5.2	3.8–4.2
Swainton, New Jersey .	(22)	10.8–13.1	3.1–3.8	4.6–5	3.1–4.3	3–3.4
Arlington, Virginia....	(2)	12.5–12.8	3.7–3.8	5.1–5	4.2–4.3	3.3–3.6
Raleigh, North Carolina.....	(7)	13.4–15	3.8–4.6	5.8–6.6	4.3–4.9	3.7–4.3
Southern Pines, North Carolina.....	(4)	13.5–15	4.2–4.4	5.8–6	4.7–4.8	3.8–3.9
Jacksonville, Florida...		15.5	4.6	6.3	4.9	4.1
Fort Myers, Florida...		15.2	4.9	6.4	5.6	4.7
Homestead, Florida...		13	4.3	6.2	4.7	4.1
Big Pine Key, Florida..		14.5	4.7	6.5	5	4.3
Warrington, Florida...	(3)	11–14.5	3.8–4.6	5.3–5.8	3.8–4.7	3.4–4
Gulfport, Mississippi..		13	4.3	5.7	4.3	3.7
San Antonio, Texas....		14.5	4.7	6.4	4.4	4.2
Brownsville, Texas....	(4)	13.5–13.5	4.4–4.5	5.8–6.2	4.8–4.7	4–4.1

The decided size variation is apparently due rather to local environmental conditions than to true geographic influences. Thus great differences are found between the Reega (which approximates the Swainton material) and Cardiff, New Jersey, series, from localities in the pine barrens separated by but a few miles; the former locality, however, showing little undergrowth, the latter rich in grasses, blackberry vines, sweet-fern, etc. Some geographic differences are found, however, in the contour of the female tegmina and specialization of the male subgenital plate, these not sufficiently pronounced or constant to warrant racial recognition.

Coloration.—♂. (Normal.) General coloration of head, underparts and limbs ochraceous-buff, ocelli light ochraceous-buff, abdomen suffused with russet distad. Pronotum ochraceous-tawny, slightly paler laterad. Tegmina transparent, rather deep ochraceous-buff. Cerci heavily suffused with prout's brown. Every gradation is found from the recessive extreme, in which the general coloration is slightly paler, with abdomen and cerci not darkened, to the intensive extreme in which the greater portions of the

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pronotum and limbs are tawny or approaching cinnamon brown, with abdomen more heavily suffused and cerci solidly blackish brown. Occasionally paler males, particularly those from Florida, have the cerci very dark. Occasional examples, particularly among the more northern specimens, have the vertex and median portion of the face somewhat darkened; a medio-vertical band, however, is never found as conspicuous there as is normal in *uhleriana*.

♀. (Maximum recessive.) Head ochraceous-tawny, becoming clear and paler laterad, limbs clear, pale, ochraceous-tawny, ventral surface of abdomen tawny. Pronotum tawny, fading to ochraceous-tawny laterad. Tegmina transparent tawny, tinged with cinnamon-rufous, with marginal field paler. Dorsal surface of abdomen cinnamon-rufous, the proximal segments broadly suffused meso-distad with reddish brown, this increasing caudad, the distal segments and cerci dark reddish brown. Every gradation to the maximum intensive condition is found, the majority of specimens, however, being nearly intermediate, with the tawny coloration slightly deeper, becoming more sharply ochraceous laterad; tegmina tawny, with marginal field ochraceous-tawny, and abdomen blackish brown, slightly paler meso-ventrad. (Maximum intensive.) Head ochraceous-tawny, much suffused between ocellar spots and clypeal suture with deep chestnut brown. Pronotum blackish brown, becoming rather sharply ochraceous-buff laterad. Tegmina translucent blackish brown, with costal area paler and marginal field ochraceous-buff. Limbs tawny. Abdomen above and below, and cerci, blackish brown. This extreme is very rare, but numerous specimens show different degrees of near approach. It is of interest to note that the pronotum in this sex of the present species apparently is never solidly dark, a frequent condition in females of *uhleriana*. The series from the southeastern United States, the majority taken in the pine woods, show a distinctly more reddish brown general coloration than do the other series.[188]

The ootheca of this species is very similar to that of *virginica*, but larger, averaging 3.7 mm. in depth, with vertical divisions slightly less widely spaced.

[188] This has been noted in other species of Orthoptera.

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Distribution.—The present species is known on the Atlantic Coast from Wading River, Long Island, New York, southward to the Florida Keys, invading the Piedmont southward from Dyke, Virginia, but occurring in the greatest abundance in the sandy regions of Georgia and Florida. It is the only species of the genus found over the southern portion of peninsular Florida. Along the Gulf coast its range is continuous, but limited, as far as the Mississippi valley. In that region we have little data of its occurrence: our scattered records, Dallas County, Iowa; Crawford County, Indiana, and Mena, Arkansas, showing probably a wide distribution. In Texas, its distribution extends from every part of the coast to Zavalla County, its northwestern distribution appearing to be limited by the eastern edge of the Edwards plateau.

Specimens Examined:[184] 288; 68 males, 197 females and 23 immature individuals.

Wading River, Long Island, New York, VII, 26, 1914, (W. T. Davis; at Deep Pond), 1 ♀, [Davis Cln.].

Lakehurst, New Jersey, V, 31 to VII, 28, 1911 and 1912, (W. T. Davis), 3 ♀, [Davis Cln.].

Margate City, N. J., VIII, 1 to 16, 1914, (Hebard; trapped, molasses jars in heavy barrier beach forest), 5 ♀, [Hebard Cln.].

Cardiff, N. J., VII, 28 to VIII, 10, 1914, (Hebard; trapped, molasses jars in typical pine barrens undergrowth), 4 ♀, 1 juv. ♂, 2 very small juv., [Hebard Cln.].

Reega, N. J., VII, 20 to VIII, 20, 1914, (Hebard; trapped, molasses jars in pine barrens with heavy, grassy undergrowth), 35 ♀, [Hebard Cln.].

Swainton, N. J., VII, 20 to VIII, 21, 1914, (Hebard; trapped, molasses jars on border of pine barrens and on edge of swamp). 22 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VIII, 1 to 21, 1914, (Hebard; trapped, molasses jars in heavy deciduous forest), 34 ♀, 2 very small juv., [Hebard Cln.].

Dias Creek, N. J., VII, 27 to 31, 1914, (Hebard; trapped, molasses jars in heavy oak woods), 25 ♀, 1 very small juv., [Hebard Cln.].

Seaford, Delaware, VI, (W. T. Davis), 1 ♀, [Davis Cln.].

Cabin John Run, Maryland, VI, 1911, (W. T. Davis), 1 ♀, [Davis Cln.].

Washington, District of Columbia, VI, 1910, (W. T. Davis; trapped, molasses jar), 1 ♂, 2 ♀, [Davis Cln.].

Chain Bridge, Virginia, V, 23, 1905, (A. N. Caudell; bred adult VI, 3, 1905), 1 ♀, [U. S. N. M.].

Arlington, Va., VII, 9, 1914, (Hebard; at night in forest), 1 ♂, 2 ♀,[185] [Hebard Cln.].

[184] All of the females recorded in 1910 by Rehn and Hebard, in their Revision, as *uhleriana uhleriana* are here correctly referred to *fulvescens*.

[185] Incorrectly recorded by Rehn and Hebard as *uhleriana uhleriana* and *uhleriana fulvescens*.

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Falls Church, Va., VII, 1 ♀, [U. S. N. M.].

Dyke, Va., VII, 28, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Tappahannock, Va., VII, 18, 1916, (H. Fox), 1 ♀, [Hebard Cln.].

Raleigh, North Carolina, V, 18 to VII, 2, 1904 and 1905, (C. S. Brimley; bred adult VI, 4 to VII, 2, 1904), 3 ♂, 7 ♀,[186] [Hebard Cln. and U. S. N. M.].

Southern Pines, N. C., VI, 3 to VII, 14, 1915, (A. H. Manee), 9 ♂; VIII, 4 to 17, 1915, (A. H. Manee), 7 ♂, 4 ♀, 1 ootheca, [all Hebard Cln.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard; under debris in dead short-leaf pine needles), 2 ♀,[187] [Hebard Cln.].

Wilmington, N. C., VIII, 1, (G. P. Englehardt), 1 ♀, [Davis Cln.].

Columbia, South Carolina, VII, 28, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Denmark, S. C., VIII, 15, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Macon, Georgia, VII, 30 and 31, 1913, (Rehn and Hebard; under dead leaves on edge of oak and short-leaf pine woods), 2 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Brunswick, Ga., VIII, 30, 1911, (Hebard; under bark of pine log), 1 ♂, [Hebard Cln.].

St. Simon's Island, Ga., VIII, 30, 1911, (Rehn; among dead leaves under live oaks), 1 ♀, [A. N. S. P.].

Billy's Island, Okeefenokee Swamp, Ga., VII, 1912, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Honey Island, Okeefenokee Swamp, Ga., VI, 1, 1912, (J. C. Bradley), 3 ♂, 1 ♀, 2 juv. ♂, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Thomasville, Ga., III, 23 to VII, 28, 1903, (Hebard; for Hebard), 6 ♂,[188] [Hebard Cln. and A. N. S. P.].

Spring Creek, Decatur County, Georgia, VI, 7 to 23, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.]; VII, 16 to 19, 1912, (J. C. Bradley), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (T. J. Priddey), 6 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Atlantic Beach, Fla., VIII, 25, 1911, (Rehn and Hebard; under refuse), 1 ♂, 5 ♀, [Hebard Cln. and A. N. S. P.].

Pablo Beach, Fla., IX, 5, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Live Oak, Fla., VIII, 10, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

Warrington, Fla., VIII, 4, 1903, (A. P. Morse), 1 ♂, 3 ♀, [Morse Cln.].

St. Augustine, Fla., (C. W. Johnson), 1 ♀, [A. N. S. P.].

Ormond, Fla., IV, 10, 1899, (W. S. Blatchley), 1 ♀,[189] [Hebard Cln.]; 1 ♂, [M. C. Z.].

Fort Reed, Fla., II to V, (J. H. Comstock), 2 ♂,[190] [Cornell Univ. Cln. and M. C. Z.].

[186] Not only was material from this locality recorded incorrectly by Rehn and Hebard as *uhleriana uhleriana* and *uhleriana fulvescens*, but also male specimens of *caudelli* from there were listed under those supposed geographic races.

[187] Incorrectly recorded by Rehn and Hebard as *I. borealis* (=*P. virginica*).

[188] Incorrectly recorded by Rehn and Hebard in 1905 as *uhleriana*.

[189] Incorrectly recorded by Blatchley as *I. unicolor* (=*P. uhleriana*).

[190] Incorrectly recorded by Scudder as *I. unicolor* (=*P. uhleriana*).

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Sanford, Fla., (S. B. Fraser), 6 ♂, [M. C. Z.].

Eustis, Fla., VII, 19, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; under sign on *Pinus caraibea*), 1 ♂, [Hebard Cln.].

Miami, Fla., IX, 24, 1913, (W. T. Davis), 1 ♀, [Davis Cln.].

Cocoanut Grove, Fla., IX, 14, 1913, (W. T. Davis), 1 ♂, [Davis Cln.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard; males in spider webs of railway station), 2 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Big Pine Key, Fla., IX, 19 and 20, 1913, (W. T. Davis), 1 ♂, 1 ♀, [Davis Cln.].

Sugarloaf Key, Fla., III, 1898, (O. F. Cook), 1 juv. ♀, [U. S. N. M.].

Sarasota, Fla., II, 21, 1911, (W. S. Blatchley), 1 ♀, [Blatchley, Cln.]; III, 2, 1911, 1 juv. ♂, [Cornell Univ. Cln.].

Lakeland, Fla., V, 8, 1912, (W. T. Davis), 1 ♀, [A. N. S. P.]; XI, 10, 1911, (W. T. Davis), 3 juv. ♂, 2 small juv. ♂, 1 small juv. ♀; V, 4 and 8, 1911, (W. T. Davis), 2 ♀, [both in Davis, A. N. S. P. and Hebard Clns.].

Punta Gorda, Fla., XI, 13, 1911, (W. T. Davis), 1 juv. ♂, [Hebard Cln.].

Useppa Island, Charlotte Harbor, Fla., V, 17 to 19, 1915, (Hebard), 1 small juv., [Hebard Cln.].

Fort Myers, Fla., III, 30, 1911, (W. T. Davis), 1 ♀,[191] [Davis Cln.].

Wiggins, Mississippi, IV, 18, (F. M. Jones), 1 ♂, [A. N. S. P.].

Ocean Springs, Miss., VI, 1905, (J. H. Comstock), 1 juv. ♂, [Cornell Univ. Cln.].

Gulfport, Miss., VII, 18, 1905, (A. P. Morse), 2 ♂, 1 ♀, [Morse Cln.].

Dallas County, Iowa, VIII, (J. A. Allen), 1 ♀, [M. C. Z.].

Mountain Grove, Missouri, VII, 21, 1916, (for Somes; trapped, molasses jar), 3 ♀, [Somes Cln.].

Mena, Arkansas, VII, 30, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].

Paris, Texas, IV, 7, 1904, (at light), 1 ♂, [U. S. N. M.].

Dallas, Tex., VI, 7, 1907, (W. D. Hunter), 1 juv. ♂, [U. S. N. M.].

Tyler, Tex., VI, 27, 1906, (F. C. Bishopp), 1 ♀, [U. S. N. M.].

Waco, Tex., (Belfrage), 1 ♂, [U. S. N. M.].

Round Mountain, Tex., (F. G. Schaupp), 1 ♂, [A. N. S. P.].

Shovel Mountain, Burnet County, Tex., VII, 7 and 10, 1901, (F. G. Schaupp), 2 ♂, [A. N. S. P.].

Rosenberg, Tex., VII, 25, 1912, (Hebard; night at light), 1 ♂, [Hebard Cln.].

Victoria, Tex., VI, (A. N. Caudell), 2 ♂,[192] [U. S. N. M.].

San Antonio, Tex., VIII, 15 and 16, 1912, (Rehn and Hebard; dead leaves under oaks), 1 ♂, 1 ♀ with ootheca, [Hebard Cln.].

Live Oak County, Tex., IV, 29, 1906, (J. D. Mitchell), 1 ♀, [U. S. N. M.].

Nueces River in Zavalla County, Tex., IV, 27, 1910, (Hunter and Pratt), 1 ♀, [U. S. N. M.].

Brownsville, Tex., IV, 30, 1904, (H. S. Barber), 1 ♀,[193] with ootheca, [U. S. N. M.];

[191] Recorded by Rehn and Hebard incorrectly as *I. couloniana* (meaning *P. lata*).

[192] Incorrectly recorded by Caudell as *uhleriana*.

[193] Incorrectly recorded by Caudell as *uhleriana*.

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VII, 31 to VIII, 5, 1912, (Hebard; on ground under rats' nests, *Neotoma* sp.), 3 ♀, with 1 ootheca, [Hebard Cln. and A. N. S. P.].

San Tomas, near Brownsville, Tex., IV, 26, (C. Schaeffer), 1 ♀,[194] [Bklyn. Inst.]; V, 30, 1904, (H. S. Barber), 1 ♂, 1 juv. ♀, [U. S. N. M.].

Parcoblatta caudelli new species (Plate V, figures 1 to 5.)

1910. *Ischnoptera uhleriana fulvescens* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 439. (In part.[195]) [3 ♂, Raleigh, North Carolina.]

1910. *Ischnoptera insolita* Rehn and Hebard, ibid., p. 450. (Females only.[196]) [1 ♀, Tryon, North Carolina; 1 ♀, Crawford County, Indiana.]

1916. *Ischnoptera insolita* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 118. (Female sex described as that species.) [1 ♀, Spartanburg, South Carolina.]

Insufficient material resulted in the failure to recognize males of the present insect as widely distinct from *fulvescens* and the unfortunate description of the sexes of distinct species as *insolita*, the males of which represent *desertae*, the females the present species.

This insect is distinctive among the uniform pale species of the genus in having the females supplied with fully developed tegmina and wings, which, though not as ample as in the males, reach beyond the apex of the abdomen.

The males, among the uniform pale species, agree with *P. lata* and *P. notha* in the type of specialization of the median and first dorsal abdominal segments; the elevations there found are slightly less pronounced than in *lata*, decidedly less pronounced than in *notha*. The size is decidedly smaller than in either of those species, the form distinctly narrower than in *lata* and broader than in *notha*, with supra-anal plate of very different form from that found in the latter species. The general character of the supra-anal and subgenital plates is much as in *lata*, but the styles are decidedly longer, in this respect agreeing more nearly with *P. uhleriana*; the styles are not as elongate as in *notha*. In general appearance nearest similarity is found in *P. fulvescens*.

[194] Recorded, with a question, incorrectly by Caudell as *couloniana*.

[195] These specimens appeared to those authors to represent the intermediate condition between the supposed races *uhleriana uhleriana* and *uhleriana fulvescens*. At that time, the specialization of the dorsal surface of the male abdomen had never been considered.

[196] The male described as *I. insolita* has been selected as single type and, in consequence, the name *insolita* falls in the synonymy under *P. desertae*.

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Type.— ♂; Raleigh, North Carolina. June 18, 1904. (C. S. Brimley.) [Hebard Collection, Type No. 425.]

Description of Type.—Size medium for the genus, form moderately slender. The cephalic and pronotal features agree throughout with *fulvescens*. Head rather evenly rounded, with ocelli well defined, but margin of ocellar areas rounding rather weakly into the inter-ocular-ocellar area, which is feebly flattened, weakly convex, showing a few microscopic punctae. Interocular space intermediate in width to that separating the ocelli and that between the antennal sockets. Pronotum with greatest width slightly caudad of mesal point, with cephalic angles more broadly rounded than caudal angles and oblique sulci of disk weakly defined. Tegmina and wings normal, fully developed; tegmina, as in *fulvescens*, with greatest width very slightly greater than that of pronotum. Median segment supplied mesad with two small and weak elevations, with cephalic faces of each furnished with a heavy tuft of hairs, the surface of the segment is also supplied cephalad of these with a few minute, scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the minute scattered hairs are less numerous. Sixth dorsal abdominal segment with distal margin transverse, showing very broad and feeble concavity laterad and similar convexity mesad. Supra-anal plate with lateral margins nearly straight, convergent to bluntly rounded apex, surface of plate feebly convex above cerci, in remaining portion weakly concave and declivent distad. Cerci slender and elongate. Genital hook concealed, adjacent process as found in *fulvescens*. Subgenital plate weakly convex to immediate bases of styles, where it is weakly concave, lateral margins nearly straight and weakly convergent to styles, but the sinistral margin showing a feeble concavity distad, distal margin between the styles nearly straight, transverse; styles small, simple, cylindrical processes, situated in sockets on ventral surface of plate at disto-lateral angles, in length each slightly less than the space intervening between their bases. Exposed folded ventral portion of seventh dorsal abdominal segment in length equal to exposed portion of ninth ventral abdominal segment.

The series of males before us shows the following variation. Size individually variable but with some geographic significance. Interocular space occasionally no wider than width between ocelli. Pronotum with discal sulci sometimes subobsolete. Wings with two to four incomplete and four to five complete rami of the ulnar vein. Supra-anal plate with apex varying from rather sharply to rather broadly rounded and with concave surface rarely showing a feeble, transverse, weakly arcuate ridge, a feature normally rather prominent in *fulvescens*. Subgenital plate with distal concavity of sinistral margin occasionally more pronounced.

Allotype.— ♀; Spartanburg, South Carolina. August 6, 1913. (M. Hebard.) [Hebard Collection.]

Description of Allotype.—Size smaller than male. Head more evenly rounded, but with ocellar areas still present, though weakly defined, and ocelli approaching a condition of large ocellar spots. Interocular space broader than in male, nearly as wide as width between the more widely spaced antennal sockets. Pronotum pro-

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portionately longer than in male, but with discal sulci similarly weakly defined. Tegmina and wings as in male, but less elongate; extending, however, beyond the apex of the abdomen. Supra-anal plate about half as long as broad, trigonal, with lateral margins concave-convergent and apex rather sharply rounded. Cerci similar to those of male but proportionately shorter. Subgenital plate convex, weakly produced, with distal margin broadly convex.

The female before us from Natchez, Mississippi, differs only in having the pronotum shorter and the concavity of the lateral margins of the subgenital plate weaker.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Washington, District of Columbia	(3)	14.3–14.7	3.3–3.4	4.6–4.7	15.7–15.9	4.9–5
Falls Church, Virginia.		12.5	2.9	4.1	13.4	4.3
Tappahannock, Virginia (6 *paratypes*)		13.4–14.6	3.2–3.4	4.3–4.7	13.8–15.4	4.5–4.8
Raleigh, North Carolina, *type*		15.2	3.3	4.6	15.2	4.7
Raleigh, North Carolina (2 *paratypes*)		14.2–15.4	3.3–3.4	4.5–4.7	15.3–16	4.9–5.2
Southern Pines, North Carolina		16	3.4	4.6	15.1	4.7
Rich Mountain, Arkansas		12.9	3.4	4.6	14.8	4.7
Dallas, Texas		13.7	3.4	4.4	13.3	4.3
Waco, Texas	(6)	12.2–13.1	3.1–3.3	3.9–4.4	11.8–13.8	3.9–4.2
♀						
Spartanburg, South Carolina, *allotype*		12.2	3.6	4.1	11.8	3.9
Crawford County, Indiana		12.3	3.2	4.1	11.5	4
Natchez, Mississippi		10.7	3.2	4.1	11.4	3.8

Though individual size variation is evident, it appears that, in the drier portions of the species' distribution in Texas, an average reduction in size occurs.

Coloration.—♂. (*Type.* Normal.) Head light ochraceous-buff; the occiput to between the ventral margins of the ocelli suffused with ochraceous-tawny; a narrow, transverse suffusion of the same color mesad on the face and separated from the marking described by a very narrow line of light ochraceous-buff, which unites the light ochraceous-buff ocelli. Limbs light ochraceous-buff, the

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abdomen of the same color, suffused with prout's brown. Pronotum with disk ochraceous-tawny, the lateral margins transparent, light ochraceous-buff. Tegmina transparent buckthorn brown, the marginal fields transparent, light ochraceous-buff. Wings hyaline, very weakly tinted with ochraceous-buff, area of costal veins suffused with ochraceous-buff. Dorsal surface of abdomen and cerci weak ochraceous-tawny. Frequently the suffused cephalic markings are obscure or absent, but in occasional specimens of more intensive coloration these markings, as described, are strongly defined in tawny. In such specimens the cerci are, very rarely, dark brown. In the maximum of recessive coloration the darker markings of the insect are all less decided, the pronotum ochraceous-buff, with disk feebly washed with orange brown.

♀. (All before us.) Almost solidly ochraceous-tawny, the lateral margins of pronotum, marginal fields of tegmina and the limbs paler, the ocelli light ochraceous-buff.

We take great pleasure in dedicating this interesting species to our good friend, Mr. A. N. Caudell, custodian of Orthoptera in the U. S. National Museum.

Specimens Examined: 30; 26 males and 4 females.

Washington, District of Columbia, VI, 18, 1912, (A. N. Caudell), 1 ♂, [U. S. N. M.]; VI, 26, 1911, (W. T. Davis), 2 ♂, [Davis Cln.].

Falls Church, Virginia, I, 7, 1914, (A. N. Caudell; bred adult V, 4, 1914), 1 ♂, [U. S. N. M.]

Charlottesville, Va., VI, 15, 1914, (H. Fox), 2 ♂, [Hebard Cln.].

Tappahannock, Va., VI, 9 to 17, 1915, (H. Fox; 1 at night on shrubbery), 6 ♂, *paratypes*, [Hebard and Fox Clns.].

Raleigh, North Carolina, VI, 16 to VII, 1, 1904, (C. S. Brimley; attracted to light), 3 ♂,[197] *type* and *paratypes*, [Hebard Cln.].

Southern Pines, N. C., VII, 14, 1915, (A. H. Manee), 1 ♂, *paratype*, [Hebard Cln.].

Tryon, N. C., (W. F. Fiske), 1 ♀, [U. S. N. M.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard; under sign on tree), 1 ♀,[198] *allotype*, [Hebard Cln.].

Crawford County, Indiana, VI, 30, 1902, (W. S. Blatchley), 1 ♀, *allotype* of *I. insolita* Rehn and Hebard, [Blatchley Cln.].

Rich Mountain, Arkansas, VII, 2, 1905, (A. P. Morse), 1 ♂, [Morse Cln.].

[197] See footnote 195. These specimens were similarly misidentified.

[198] See reference. Previously determined as *I. insolita* by Rehn and Hebard.

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Natchez, Mississippi, VI, 7, 1909, (E. S. Tucker), 1 ♀, [U. S. N. M.].

Dallas, Texas, VII, 7, (J. Boll), 1 ♂, [M. C. Z.]; VI, 16, (J. Boll), 1 ♂, [U. S. N. M.].

Waco, Tex., VII, 9 to 22, (Belfrage), 7 ♂, [M. C. Z. and U. S. N. M.].

Parcoblatta lata (Brunner) (Plate V, figures 6 to 10; plate VI, figure 1.)

1865. *I[schnoptera] lata* Brunner, Nouv. Syst. Blatt., p. 135. (Exclusive of synonymy.) [♂, North America ? [199]]

1869. *Ischnoptera hyalina* Scudder, Trans. Am. Ent. Soc., ii, p. 307. [♂, Delaware.]

1893. *Temnopteryx major* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 54. [♀, Tennessee.]

1905. *Ischnoptera inaequalis* Rehn and Hebard, (not of Saussure, 1862), Proc. Acad. Nat. Sci. Phila., 1904, p. 779. (In part.) [♂, Thomasville, Georgia.]

1905. *Ischnoptera major* Rehn and Hebard, ibid., p. 780. [Juv.; Thomasville, Tyty Plantation and Ocklockonee River, Georgia.]

1910. *Ischnoptera couloniana* Rehn and Hebard, (not of Saussure, 1862), Proc. Acad. Nat. Sci. Phila., 1910, p. 433. (Excepting references for *I. couloniana* by Saussure and Saussure and Zehntner.) [Twenty records from Delaware to Texas.]

Scudder, evidently misled by Brunner's[200] incorrect and questioned synonymy under *lata* of *Blatta elongata* Beauvois and *Ischnoptera nortoniana* Saussure, described the male of the present species as *I. hyalina*, the type of which is before us. Failure to associate the sexes resulted in Saussure and Zehntner's synonym, *Temnopteryx major*.

The problem of properly associating these names has been extremely difficult. Rehn and Hebard, in 1910, worked out the above synonymy in full, but unfortunately considered that *I. couloniana* Saussure, represented the present species.[201] Careful comparison of the figure of that species, the measurements and description, with the much larger series of the genus now available,

[199] Brunner's description fits material before us in every detail, and we feel little doubt as to the correctness of his locality. His clearly incorrect synonymy has resulted in the failure of subsequent authors to place properly this name.

[200] The synonymy indicated by Brunner, in his "Nouveau Systeme des Blattaires," was clearly made in haste, and in the majority of cases without careful study of the data at hand or examination of material involved. The valueless character of such synonymic effort is illustrated by his placing *I. couloniana* Saussure under *I. pensylvanica* on page 136, and under *I. lata* on page 413.

[201] But two records by Rehn and Hebard as *couloniana* do not represent the present species. The specimen from Anglesea, New Jersey, recorded in 1916, is a male showing the maximum recessive coloration of *divisa;* the female from Fort Myers, Florida, recorded in 1914, is an exceptionally large example of *fulvescens*.

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leaves no room for doubt that *couloniana* must be placed in the synonymy under the older *P. pensylvanica* (De Geer).

Normal representatives of both sexes of the present species agree in many ways with *P. fulvescens*, but are very much larger. In the male, however, the specialization of the proximal dorsal abdominal segments is of the type found in *P. caudelli*, the projections being more pronounced in *lata*. In the female the tegmina are normally roundly truncate distinctly beyond the apex of the anal field, a condition never found in females of *fulvescens*.

This is the largest and most robust of the normally pale species of the genus. The maximum intensive coloration, found in males from the Mississippi valley region, gives such specimens a decided similarity to that sex of *P. pensylvanica;* however, these are easily separated by the very different specialization of the proximal abdominal segments, outline of sixth dorsal abdominal segment and of supra-anal plate, and the less elongate and broader tegmina and wings.

Characters of Male.—(Raleigh, North Carolina.) Size large, form robust. Head rather evenly rounded for this sex, ocelli well-defined, margins of ocellar areas rounding weakly into inter-ocular-ocellar area, which area is feebly flattened. Pronotum ample, with greatest width (normally) mesad,[202] but with lateral margins from this point slightly more convergent cephalad than caudad, oblique sulci of disk weakly defined. Tegmina and wings fully developed, normal; tegmina moderately broad, but with point of greatest width meso-proximad; wings (in the series) with two to four incomplete and five to seven complete rami of the ulnar vein. Median segment supplied mesad with two small and weak ridges, convergent cephalad, with cephalic faces of each supplied with a heavy tuft of hairs, surface of segment well supplied cephalad of these ridges with minute, but rather stout, scattered hairs. First dorsal abdominal segment similarly specialized in every way, except that the ridges are slightly more pronounced and the scattered hairs cephalad are fewer. Sixth dorsal abdominal segment with distal margin nearly straight, transverse; seventh with distal margin weakly angulate-emarginate mesad, with sides of emargination convex; eighth with distal margin showing (normally) a similar, but very slight, emargination. Supra-anal plate with lateral margins convergent and weakly convex from cerci to broadly rounded apex,[203] surface very briefly convex above cerci, feebly and unevenly concave in entire remaining portion, which is strongly

[202] Frequent specimens in the series show this slightly caudad of the mesal point. The margins of the pronotum also often show slight differences in the degree of curvature.

[203] Frequent variation occurs in the form of this plate; often slight irregularities of the margins are found, while the apex varies from broadly blunt (though never as blunt as in *pensylvanica*) to rather sharply rounded.

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declivent distad. Cerci elongate and slender, with lateral margins moderately crenate distad. Subgenital plate weakly convex, except at immediate base of sinistral style and more extensively at base of dextral style, where it is weakly concave; free margin roughly convex except before base of sinistral style, where a brief emargination (normally) occurs.[204] Styles small, simple and cylindrical, situated disto-laterad in sockets on the ventral surface of the plate at the free margin, each slightly shorter than half the distance between their bases. Exposed folded ventral portion of seventh dorsal abdominal segment in length equal to exposed portion of ninth ventral abdominal segment.

Characters of Female.—(Raleigh, North Carolina.) Size very large, form very robust. Head larger and more evenly rounded than in male, with interocular space slightly less than that between antennal sockets, large ocellar spots present. Pronotum very much larger than in male, with greatest width at point near caudal margin and discal sulci obsolete. Tegmina represented by broad, quadrato-ovate pads; veins distinct; sutural margins overlapping; distal margin broadly rounded, with its mesal portion (normally) transverse,[205] the truncation commencing distinctly beyond the apex of the anal field.[206] Wings represented by decidedly atrophied pads, with apices acute, fields and veins subobsolete. Sixth dorsal abdominal segment with distal margin briefly concave laterad, broadly and distinctly convex mesad. Supra-anal plate nearly half as long as wide, lateral margins convergent and feebly concave to rather bluntly rounded apex. Subgenital plate strongly convex, with free margin showing a weak concavity proximo-laterad before bases of cerci, thence feebly convex throughout, but with mesal portion showing a broad flattening of this convexity.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen[207]	Width of tegmen
Delaware.....	—	4.8	6.1	21.8	6.4
Plum Point, Maryland	17.5	4.6	5.7	18.9	5.7
Raleigh, North Carolina..... (11)	20–21.5	4.8–5.2	5.9–6.4	19.4–22.1	6–6.8
Jacksonville, Florida..	19.5	4.5	5.8	19.7	5.9
Crawford County, Indiana.....	20.5	4.6	5.7	21.8	6.7

[204] This concavity is occasionally subobsolete; rarely it is broader and more extensive, extending over half the sinistral margin.

[205] In some series this margin is evenly and broadly convex, very rarely a faint concavity is indicated on the margin of the discoidal field.

[206] Rare specimens have this truncation commencing immediately at the apex of the anal field. In such specimens the usually much greater size serves to separate them from females of *fulvescens*, to which of the other species they alone bear a general resemblance. It is important to note that *fulvescens* attains its greatest size development in southern peninsular Florida, in which region *lata* apparently does not occur.

[207] The length of the exposed portion of the tegmen is given for females.

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♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Evergreen, Alabama.		18.2	4.1	5.4	17.8	5.2
St. Louis, Missouri...	(4)	18.5–19	4.7–4.9	6.1–6.7	20.7–21.4	6.2–6.4
Natchez, Mississippi..	(2)	18–20	4.2–4.8	6–6.7	18.4–21.7	5.8–6.8
Tallulah, Louisiana...		18.5	4.8	6.4	18.7	6.3
Baton Rouge, Louisiana.....		19.2	4.8	6.6	19.9	6.3
♀						
Plum Point, Maryland	(2)	19.5–20	5.4–5.8	7.4–7.7	7.1–7.4	5.4–5.2
Raleigh, North Carolina.....	(20)	18.5–22	5.4–6.2	7.1–8.2	6.3–8	4.7–5.7
Ortega, Florida.....	(2)	18–18.5	4.8–5.2	6.8–7.3	6–6.7	4.7–5
Crawford County, Indiana.....	(4)	17–18	4.9–5.4	7.1–7.8	5.9–6.7	4.8–5.3
Evergreen, Alabama..	(11)	15.7–18.5	5–5.8	6.7–7.8	6–6.9	4.8–5.6
St. Louis, Missouri...	(3)	18–19	5.7–5.8	7.8–8.2	6.7–6.9	5.1–4.9
Natchez, Mississippi..		18.8	5.9	7.8	6.8	5.2
Beaumont, Texas....	(2)	17.5–18.5	5.7–6.1	7.6–8.1	7.3–6.4	5.3–5.1

A certain amount of geographic variation is found in this species, both in size and in coloration,[208] but very decided individual variation in both these features also occurs.

Coloration.— ♂. (Recessive.) (Normal in eastern material; 4 ♂, St. Louis, Missouri; 1 ♂, Baton Rouge, Louisiana.) Head with occiput tawny, shading to chestnut brown between the eyes and fading to tawny below the ocelli; genae and clypeus ochraceous-buff. Ventral surface of body laterad chestnut brown, shading to hazel mesad on abdomen. Limbs ochraceous-buff. Pronotum with disk clear ochraceous-tawny, with margin narrowly ochraceous-buff cephalad, more broadly laterad, the caudal portions of the lateral margins transparent. Tegmina transparent, weak ochraceous-tawny. Wings hyaline, very feebly tinged with ochraceous-buff, area of costal veins washed with ochraceous-tawny. Dorsal surface of abdomen ochraceous-tawny, becoming chestnut brown distad. Cerci chestnut brown. In the maximum recessive condition the chestnut brown is everywhere dilute and less extensive. (Weak intensive.) (1 ♂, Evergreen, Alabama; 1 ♂, Marianna, Florida.) Head, from between eyes to clypeus, chestnut

[208] Specimens from the Carolinas, from the Piedmont to the coast, average very large. Males appear to show frequent different degrees of intensive coloration in the Mississippi Valley region.

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brown, as is the entire ventral surface of the insect, including the lateral portions of the coxae. Limbs ochraceous-tawny. Pronotum with disk zinc orange mesad, shading to tawny cephalad and to chestnut brown laterad and caudad, cephalic and lateral margins light ochraceous-buff. Tegmina and wings slightly darker than in recessive condition. (Maximum intensive.) (2 ♂, Natchez, Mississippi.) (Pl. V, Fig. 6.) Head with genae and ocelli light ochraceous-buff, remaining portions chestnut brown, as is the ventral surface of the insect, becoming blackish distad on the abdomen. Limbs cinnamon brown. Pronotum with disk solid, deep chestnut brown; margins narrowly cephalad, more broadly laterad, light ochraceous-buff. Tegmina translucent cinnamon brown. Wings hyaline, tinged with cinnamon brown, heavily suffused with this color in area of costal veins and, to a less degree, in distal portion of anterior field. Abdomen with dorsal surface chestnut brown, becoming blackish distad; cerci blackish brown.

♀. (Recessive.) (Normal in eastern material, rare west of Appalachian Mountains.) Head with occiput kaiser brown, deepening below to carob brown, genae ochraceous-tawny, ocellar spots cream color. Limbs ochraceous-buff, strongly tinged with tawny from femora distad. Ventral surface of abdomen blackish brown, shading to carob brown mesad. Pronotum kaiser brown, sometimes, to different degrees, shading to ochraceous-buff laterad, particularly latero-caudad. Tegmina translucent kaiser brown, with marginal field ochraceous-buff. Dorsal surface of abdomen blackish brown, proximad the segments, in increasing degree, are deep hays russet in broad proximo-mesal portion. In the maximum intensive condition the insect is entirely shining blackish brown, except the marginal fields of the tegmina which are translucent ochraceous-buff, suffused with carob brown. Even the ocellar spots are blackish brown and scarcely discernible. In specimens of decided intensive coloration the margins of the pronotum laterad are not unfrequently ochraceous-buff, the extent of this coloring being individually variable.

Immature individuals of *lata* and *fulvescens* might easily be confused in the earlier stages, in the present species the head is normally decidedly darkened. In *lata*, half grown specimens are

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already nearly as large and appreciably broader than normal adults of *fulvescens*. Immature examples of *P. pensylvanica*, which are unusually pale in general coloration, are easily confused in early, as well as late, stages with those of the present species.

The ootheca is carried with suture laterad. It is similar to that of *fulvescens*, except that the microscopic granulations of its surface are somewhat heavier and toward the suture are arranged in irregular longitudinal rows. The ootheca differs from that of *fulvescens* also in being often very long (9.7 mm.; Beaumont, Texas), its normal depth 3.9 mm.

The distribution of the present species extends on the Atlantic coast from Delaware[209] and Glendale, Maryland, to Gulf Hammock, Florida, no material having been secured in Florida south of this point.[210] Westward its distribution is known to extend as far as Beaumont, Texas; thence northward to Jacksonville, Texas; St. Louis, Missouri and Wyandotte, Indiana.

Specimens Examined: 190; 45 males, 95 females and 50 immature individuals.

Delaware, 1 ♂, *type* of *I. hyalina* Scudder, [Amer. Ent. Soc., in A. N. S. P.].

Laurel, Maryland, VII, 15, 1883, 2 ♀, [Hebard Cln.].

Chestertown, Md., VIII, 5, 1901, (E. G. Vanatta), 2 ♀, [A. N. S. P.].

Plum Point, Md., VI, 21, 1914, (J. D. Hood), 1 ♂, 2 ♀, [U. S. N. M.].

Lloyds, Dorchester County, Md., VII, 10, 1907, (H. S. Barber), 1 ♀, [U. S. N. M.].

Washington, District of Columbia, IV, 1904, (A. N. Caudell), 2 juv. ♂; 1 ♂, [U. S. N. M.].

Falls Church, Virginia, (N. Banks), 1 ♂; V, 6, 1903, 1 juv. ♂, 1 juv. ♀; VI, 23, 1 ♀, [all U. S. N. M.].

Ocean View, Va., VIII, 9, 1904, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Raleigh, North Carolina, III, 7, 1905, (S. W. Foster), 1 juv. ♂, [Cornell Univ. Cln.]; VI, 7 to VII, 8, 1904, (C. S. Brimley: bred, VI, 11 to 21; under bark of pine logs), 11 ♂, 20 ♀, [Hebard Cln. and A. N. S. P.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard; under bark of short-leaf pine stump), 1 ♀, [A. N. S. P.].

Southern Pines, N. C., VI, 2 to VIII, 17, 1915, (A. H. Manee), 5 ♂, 10 ♀, [Hebard Cln.].

Wilmington, N. C., VIII, 1, (G. P. Englehardt), 1 ♀, [Davis Cln.].

Winter Park, N. C., IX, 7, 1911, (Rehn and Hebard), 1 small juv., [Hebard Cln.].

Lake Waccamaw, N. C., IX, 8, 1911, (Rehn and Hebard; in sweet gum logs and stumps), 4 juv. ♂, 3 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

[209] See footnote 201.

[210] See footnote 201.

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Nance, N. C., VI, 12 and 16, 1906, (S. W. Foster), 2 ♂, [Cornell Univ. Cln.].

Charlotte, N. C., VII, 27, 1913, (Rehn and Hebard; under sign on red oak), 1 ♀, [Hebard Cln.].

Tryon, N. C., V, 20, (W. F. Fiske), 1 ♂, [U. S. N. M.].

Sulphur Springs, N. C., VI, 5, 1904, (Hebard), 2 ♂, 1 juv. ♂, [Hebard Cln.].

Florence, South Carolina, IX, 6, 1911, (Rehn and Hebard; under bark of short-leaf pine log), 1 juv. ♂, [Hebard Cln.].

Columbia, S. C., VII, 28, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Spartanburg, S. C., VIII, 6, 1913, (Hebard), 2 ♀, [Hebard Cln. and A. N. S. P.].

Clayton, Georgia, VI, 1909, (W. T. Davis), 1 ♂, [Davis Cln.].

Thompson's Mills, Ga., (H. A. Allard), 1 ♂, [U. S. N. M.].

Atlanta, Ga., V, 6 to 18, 1899, (J. H. Emerton), 1 ♂, [M. C. Z.]; VIII, 18, 1912, 2 ♀, [A. N. S. P. and Hebard Cln.].

Egypt, Ga., (W. H. Finn), 1 ♀, [U. S. N. M.].

Macon, Ga., VII, 30 and 31, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Thomasville, Ga., IX, 21 to III, 25, 1903 and 1904, (Hebard), 4 juv. ♂, 3 juv. ♀; V, 6, 1903, (for Hebard), 1 ♂, [all Hebard Cln. and A. N. S. P.].

Bainbridge, Ga., 1 ♀, [Hebard Cln.].

Spring Creek, Decatur County, Ga., VII, 16 to 29, 1912, (J. C. Bradley), 1 ♂, 1 ♀, [A. N. S. P. and Hebard Cln.].

Jacksonville, Florida, IV, 19, (P. Laurent), 1 ♂, [Hebard Cln.].

Ortega, Fla., IX, 6, 1913, (W. T. Davis), 2 ♀, [Davis and Hebard Clns.].

Gulf Hammock, Levy County, Fla., III, (P. Laurent), 1 ♂, [A. N. S. P.]

Tallahassee, Fla., VIII, 8, 1903, (A. P. Morse), 1 ♀, [Morse Cln.].

River Junction, Fla., VIII, 31, 1915, (Hebard; under bark of pine log), 1 juv. ♂, [Hebard Cln.].

Marianna, Fla., VIII, 7, 1903, (A. P. Morse), 1 ♂, 1 ♀, [Morse Cln.].

De Funiak Springs, Fla., VIII, 5, 1903, (A. P. Morse), 3 ♀, [Morse Cln.].

Montgomery, Alabama, IX, 8, 1915, (Hebard; juv. moderately numerous under bark of dead short-leaf pines), 1 juv. ♀, [Hebard Cln.].

Selma, Ala., IX, 9, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Greenville, Ala., VIII, 3, 1915, (Hebard; under dead pine bark), 1 ♀, 3 small juv., [Hebard Cln. and A. N. S. P.].

Dothan, Ala., IX, 7, 1915, (Hebard; under bark of long-leaf pine stumps), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Evergreen, Ala., VIII, 4, 1915, (Hebard; majority with many young under bark of pine stump), 1 ♂, 11 ♀, 3 juv. ♂, 2 small juv., [Hebard Cln. and A. N. S. P.].

Flomaton, Ala., VIII, 1, 1903, (A. P. Morse), 4 ♀, [Morse Cln.].

Mobile, Ala., VIII, 26, 1915, (Rehn and Hebard; occasional under signs on long-leaf pines, where *Aglaopteryx gemma* Hebard, was more numerous), 6 ♀, 1 juv. ♂, 1 small juv., [Hebard Cln. and A. N. S. P.].

Wyandotte, Crawford County, Indiana, V, 7, 1902, (W. S. Blatchley), 1 ♂; V, 18, 1902, (W. S. Blatchley), 1 juv. ♀; VI, 27 to VII, 7, 1899 to 1902, (W. S. Blatchley), 5 ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

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Posey County, Ind., VI, 6, 1904, (W. S. Blatchley), 1 ♀, [Blatchley Cln.].

Agricultural College, Mississippi, III, 25 to 31, 1903, (J. H. Comstock), 2 juv. ♀, [Cornell Univ. Cln.].

Jackson, Miss., IX, 12, 1915, (Hebard), 1 juv. ♂, [Hebard Cln.].

Natchez, Miss., V, 20, 1909, (E. S. Tucker; in dead oak), 1 ♀; VI, 7, 1909, (E. S. Tucker; at sugar), 2 ♂, [all U. S. N. M.].

St. Louis, Missouri, VI, 24 to VIII, 16, 1904, (C. L. Heink), 4 ♂, 3 ♀, [Hebard Cln.].

Monteer, Mo., V, 30, 1915, (M. P. Somes), 1 ♀, 1 juv. ♀, [Somes Cln.].

Tallulah, Louisiana, II, 20, 1910, (R. A. Cushman; under bark), 2 ♀; V, 20, 1910, (V. I. Safro), 1 ♂, [all U. S. N. M.].

West Monroe, La., VIII, 21, 1915, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Baton Rouge, La., VI, 1905, (A. W. Morrill), 1 ♂, [U. S. N. M.].

Lake Charles, La., XI, 13, (J. C. Crawford), 4 juv. ♀, [U. S. N. M.].

Jacksonville, Texas, X, 12, 1905, (W. D. Pierce), 1 juv. ♀, [U. S. N. M.].

Beaumont, Tex., VII, 23, 1912, (Hebard; under bark of pine stumps), 2 ♀, 1 juv. ♀, 1 ootheca, [Hebard Cln.].

Hockley, Tex., VI, 16, (F. W. Thouron), 1 ♂, [U. S. N. M.].

Parcoblatta divisa (Saussure and Zehntner) (Plate V, figures 11 to 16.)

1893. *Ischnoptera divisa* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 40. [♂, Georgia.[211]]

Material of the present species has been recorded by Brimley from Raleigh, North Carolina, as *couloniana*, and as that species (but intending *lata* as now understood) by Rehn and Hebard from Anglesea, New Jersey. These authors also incorrectly included under *divisa* a female, from Rives, Tennessee, here properly assigned to *P. zebra*.

Males of the present species agree alone with those of *P. pensylvanica* in the greatly specialized character of the protuberances of the median segment; in the present species the first dorsal abdominal segment is unspecialized, while in *pensylvanica* a similar specialization there occurs. The males also show the distinct separation of these two species from the others of the genus, in the production of the seventh dorsal abdominal segment, which conceals all but

[211] This species, abundant in Georgia, with almost positive certainty does not occur in northern Mexico, a locality also given by Saussure and Zehntner.

We here fix the type locality for the species as Georgia. The remaining material of the type series is either mislabelled or represents a different species.

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the brief lateral portions of the eighth segment; this condition is the more decided in *pensylvanica*.

From those of the present species, females of *pensylvanica* are usually separated with ease by their larger size, proportionately broader pronotum, more solid colors, with lateral margins of pronotum more strikingly pale, while from east of the Appalachians the tegmina are normally decidedly longer. Females of *divisa* from central Georgia southwestward also usually have the head decidedly more flattened than in *pensylvanica*, but this feature shows some variability, even in that portion of the insect's distribution, and is of less value for material from the Atlantic coast. The interocular width averages slightly less than that between the antennal sockets in *divisa*, slightly more in *pensylvanica*. In spite of these features, due to the decided individual variation found in *divisa* and the very great plasticity in *pensylvanica*, rare females are most difficult to distinguish, as in them great convergence in many features usually of distinct value occurs.

Characters of Male.—(Raleigh, North Carolina.) Size medium large, form moderately robust. Interocular width subequal to that between the ocelli.[212] Ocelli well defined. Inter-ocular-ocellar area flattened, with surface microscopically roughened. Pronotum with greatest width (normally) mesad,[213] but with lateral margins from this point slightly more convergent cephalad than caudad, oblique sulci of disk strongly defined. Tegmina and wings normal, fully developed: tegmina with lateral margins subparallel in mesal two-thirds; wings (in the series) with one to three incomplete and five to seven complete rami of the ulnar vein.[214] Median segment supplied mesad with two decided ridges, which are weakly convergent cephalad, with their cephalic extremities overhanging the cephalic portion of the segment, which is there, and between, rather strongly concave, a low ridge connects the two projections just caudad of the concave area; ventral faces of overhanging extremities of the projections very heavily clothed with short hairs, the narrow ridge of the cephalic margin of the segment furnished mesad with numerous hairs. Other dorsal segments unspecialized: sixth with distal margin transverse; seventh weakly produced, with distal margin broadly convex, thus concealing all but the lateral margins of eighth segment and proximo-mesal portion of supra-anal plate. Supra-anal plate with free margin, between the

[212] In the series slightly less to slightly greater than this width, in all distinctly less than the width between antennal sockets.

[213] Occasionally slightly caudad of this point.

[214] In one specimen the median vein branches once; this due to individual variation, but the only instance of such in the material of the genus before us.

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cerci, evenly convex;[215] surface rather broadly convex above the cerci, strongly concave and declivent distad in entire remaining portion. Cerci elongate and slender, with lateral margins moderately crenate distad. Genital hook shorter and broader than in any other species of the genus except *pensylvanica*. Subgenital plate weakly convex, except toward bases of styles, where it is moderately concave; lateral margins moderately convex in proximal portion, then rather strongly concave and convergent to bases of styles; distal margin between styles transverse, weakly concave; styles small, simple, cylindrical processes, situated disto-laterad in sockets on the ventral surface of the plate, immediately at the sharply rounded disto-lateral angles, each slightly less than half the distance between their bases, at the base of the dextral style the dorsal surface of the plate is raised in a brief rounded knob. Exposed folded ventral portion of eighth dorsal abdominal segment in length slightly less than that of exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Albany, Georgia.) Size medium, form moderately broad. Head with face appreciably more deplanate than in this sex of any other species of the genus.[216] Interocular space slightly less than that between antennal sockets,[217] small ocellar spots present.[218] Pronotum deeper than in male, with greatest width near caudal margin and latero-caudal angles much more sharply rounded, sulci of disk obsolete.[219] Tegmina (normally) decidedly reduced, broadly sublanceolate, covering only about half the dorsal surface of the abdomen,[220] approximately twice the length of the anal field, decreasing in breadth distad; apex, in discoidal field, only moderately broadly rounded. Wings (normally) greatly reduced, extending but slightly beyond apex of anal field of tegmina, with fields and remaining portions of veins distinct.[221] Sixth dorsal abdominal segment broadly and feebly concave laterad, broadly but more decidedly convex mesad. Supra-anal plate with lateral margins (normally) nearly straight, convergent, showing a slight concavity

[215] The small series of males at hand show slight but distinct differences in form of the supra-anal plate. The free margin in one shows slight truncation; in another feeble disto-lateral angulations of this margin are suggested, a condition approaching the form normal in *pensylvanica*.

[216] This condition is decided only in the females before us from Albany, Georgia and Opelika, Alabama. Those from more northern localities in the east, can not be separated from females of *pensylvanica* by this feature.

[217] Occasional specimens have these dimensions subequal.

[218] In some females of *divisa* the ocellar spots are very weakly defined. In *pensylvanica* the ocellar spots of the female sex are normally more distinct.

[219] These are weakly indicated in many females at hand.

[220] In the series before us are females with abdomen drawn in, and in consequence completely covered by the tegmina, others have decidedly more than half of the abdomen exposed.

Two females from Opelika, Alabama, show that a much greater development in the organs of flight sometimes occurs. These have the tegmina and wings extending to the apices of the cerci, the reduction found being chiefly limited to the distal portions.

[221] Decided variation in the organs of flight occurs in females of *divisa*. The degree of reduction in tegmina and wings is proportionate. See footnote 220.

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just beyond the cercal bases, to the rather sharply rounded apex.[222] Cerci shorter than in male, with lateral margins feebly crenate distad. Subgenital plate convex; distal margin very broadly rounded, weakly truncate.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Anglesea, New Jersey..		17.3	4.6	6.2	20.8	6.6
Swarthmore, Pennsylvania.....		17.8	4.3	5.3	20.7	6.3
Raleigh, North Carolina.....	(5)	13.8–17.6	3.6–4.1	4.7–5.2	16.6–18.8	5.2–5.7
Tallulah, Louisiana....		16.7	4.3	5.6	18.2	5.7
Lafayette, Louisiana...		16.5	3.8	4.8	16.4	5.1
♀						
Anglesea, New Jersey..		16.2	4.9	5.9	9.8	5.1
Wildwood Junction, New Jersey.....		14.3	4.2	5.7	7.8	4.3
Petersburg, Virginia...	(19)	12.7–16.2	4–4.8	5.3–6.6	7.3–9	4.2–4.9
Raleigh, North Carolina.....	(3)	15–16.2	4.6–4.7	5.7–5.8	8.4–8.2	4.6–4.7
Southern Pines, North Carolina.....	(7)	13.8–16.5	3.8–4.8	5.1–6.2	7.2–9.9	4.1–4.9
Augusta, Georgia.....	(4)	13–13.8	3.7–4.3	4.8–5.3	6.6–7.9	4–4.6
Albany, Georgia.....		13.1	4	5	7.4	4.1
Opelika, Alabama....	(2)	12.7– —	3.8–3.8	4.7–4.8	10.8–10.8	4–4.3

Each series of any size shows great individual size variation. Considerable individual color variation also occurs. The females from Albany, Georgia and Opelika, Alabama, have both head and pronotum more deplanate and are much darker, than any others before us, while those from Opelika show an exceptionally full development of both tegmina and wings. These features appear to be at least in part geographic, but, from the evidence at hand, we do not think that sufficient differences of fixity in the same will be found to warrant the recognition of this condition as a geographic race.

Coloration.—♂. (Recessive.) (1, Anglesea, New Jersey.) Head with occiput cinnamon, thence a broad, vertical band of the same color extends ventrad to mesad on the clypeus, ocelli and genae

[222] The apex of the supra-anal plate varies in the series before us from very sharply, to moderately broadly, rounded. Nothing is found in this plate to assist in separating females of *divisa* and *pensylvanica*.

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cinnamon-buff. Underparts and ventral surface of abdomen warm sepia, the latter washed with verona brown. Limbs weak buckthorn brown. Cerci blackish brown. Pronotum pinkish buff, with disk cinnamon, faintly clouded with verona brown cephalo-laterad. Tegmina hyaline, tinged with tawny olive, the marginal and scapular fields very faintly; the humeral trunk proximad blackish brown. (Normal.) Occiput mikado brown, the vertical stripe below this chestnut brown. Body warm sepia with a chestnut tinge, the abdominal segments washed with clay color, the specialized area of median segment reddish brown. Limbs clay color. Cerci blackish brown. Pronotum pinkish buff with disk mesad narrowly sayal brown, shading broadly laterad to warm sepia with a chestnut tinge. Tegmina transparent, washed with tawny olive, the humeral vein in proximal third blackish brown. Wings hyaline, tinged with tawny olive, this most decided in area of costal veins, veins snuff brown. A slightly darker condition is shown by the male from Tallulah, Louisiana.

♀. (Maximum recessive.) (Occasional in eastern series.) Head mikado brown, with a large suffusion of warm sepia between the eyes and antennal sockets. Limbs and underparts sayal brown. Pronotum rich mikado brown, margined cephalad and more broadly laterad with cinnamon-buff. Tegmina transparent mikado brown with marginal field, and scapular field to a less degree, cinnamon-buff. Dorsal surface of abdomen blackish brown, rather broadly margined laterad with pinkish buff. Cerci verona brown. In the Eastern series before us every gradation is found to the following intensive condition.[223] Head (except the very faintly paler occiput), underparts, limbs, disk of pronotum, dorsal surface of abdomen (except the buffy lateral margins) and cerci, blackish brown. Cephalic and lateral margins of pronotum cinnamon. Tegmina translucent verona brown, with marginal field, and scapular field to a less degree, cinnamon-buff. Wings hyaline faintly tinged with brown, veins verona brown, with a suffusion of the same color in the area of the costal veins and distal portion of anterior field.

[223] The pronotum in the intermediates is variously suffused to different degrees with dark brown.

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The young of the present species are in general coloration (normal Eastern material, recessive) ochraceous-tawny, mottled with darker brown. One specimen before us from Petersburg, Virginia, is much darker, while those from southwestward (Thomasville, Georgia) are uniform blackish brown, except that (in the majority) the pronotum is very feebly and narrowly margined cephalad and laterad with buffy.

The ootheca of the present species closely resembles that of *P. fulvescens*, but the sides are slightly more convex and the sutural projecting margin heavier and more serrate. The dimensions of those before us from Petersburg, Virginia, are: 7.8 by 3.6; 7.8 by 3.7; 8.2 by 3.7, and 8.6 by 3.6 mm. The ootheca of a large female from Plummer's Island, Maryland, is 8.6 by 3.8 mm.

The material listed below defines the known distribution of the species. It is almost certain that the range of the species is continued to the Gulf coast in northern Florida and along that boundary westward to the limits of the humid regions in Texas.

Specimens Examined: 94; 10 males, 43 females, 41 immature individuals.

Swarthmore, Pennsylvania, VI, 12, 1914, (E. T. Cresson, Jr.), 1 ♂, [A. N. S. P.].

Anglesea, New Jersey, VII, 8, 1 ♀, [Hebard Cln.]; VII, 11, (P. Laurent), 1 ♂,[124] [A. N. S. P.].

Wildwood Junction, N. J., VII, 1 to 8, 1914, (Hebard; trapped, molasses jars in oak forest), 1 ♀, 1 juv. ♀, [Hebard Cln.].

Delaware, 1 ♂, [A. N. S. P.].

Plummer's Island, Maryland, VI, 1912, (H. S. Barber), 1 ♀ with ootheca; VII, 23, 1905, (H. S. Barber), 1 ♀, [both U. S. N. M.].

Petersburg, Virginia, VII, 23, 1913, (Rehn and Hebard; under signs on red oaks and short-leaf pines), 19 ♀, 10 juv. ♂, 1 juv. ♀, 4 oothecae, [Hebard Cln. and A. N. S. P.].

Weldon, North Carolina, VII, 24, 1913, (Rehn and Hebard; scarce under signs on trees), 2 juv. ♂, [Hebard Cln.].

Goldsboro, N. C., VII, 25, 1913, (Rehn and Hebard), 1 juv. ♂, [Hebard Cln.].

Raleigh, N. C., V, 22 to VI, 15, 1904 and 1905, (C. S. Brimley: 3 bred VI, 9 to 15; 1 attracted to light), 5 ♂; VII, 6 to VIII, 2, 1905, (C. S. Brimley; sugaring), 3 ♀, [all Hebard Cln., A. N. S. P. and U. S. N. M.].

Charlotte, N. C., VII, 27, 1913, (Rehn and Hebard; under signs on white and red oaks and other deciduous trees), 4 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

[124] Incorrectly recorded by Rehn and Hebard as *couloniana*.

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Southern Pines, N. C., VI, 3, 1915, (A. H. Manee), 2 juv. ♂; VI, 16 to IX, 7, 1915, (A. H. Manee), 7 ♀; XI, 22 to XII, 1, 1915, (A. H. Manee), 2 large juv. ♂, 1 juv. ♀, [all Hebard Cln.].[225]

Augusta, Georgia, VII, 29, 1913, (Rehn and Hebard; under signs on short-leaf pines and sweet gums), 4 ♀, 5 juv. ♂, [Hebard Cln.].

Albany, Ga., VIII, 1, 1913, (Rehn and Hebard; under sign on long-leaf pine), 1 ♀, [Hebard Cln.].

Thomasville, Ga., III, 25 to IV, 9, 1904, (Rehn and Hebard; under signs on oaks), 5 large juv. ♂; XII, 1, 1903, (Hebard; under bark), 1 juv. ♂, [all Hebard Cln.].

Opelika, Alabama, VIII, 2, 1915, (Hebard; under bark of pine stumps), 2 ♀, [Hebard Cln.].

Tallulah, Louisiana, VI, 8, 1910, (V. I. Safro), 1 ♂, [U. S. N. M.].

Lafayette, La., VIII, 9, 1915, (Rehn and Hebard; under sign on oak), 1 ♂, 3 ♀, 4 juv. ♂, [Hebard Cln. and A. N. S. P.].

Parcoblatta pensylvanica (DeGeer) (Plate V, figures 17 to 20; plate VI, figures 2 to 4.)

1773. *Blatta pensylvanica* DeGeer, Mém. l'Hist. Ins., iii, p. 537, pl. 44, fig. 4. [♂, Pennsylvania.]

1862. *B[latta] borealis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 166. [♂, North America.]

1862. [*Ischnoptera*] *couloniana* Sauss., ibid., p. 169. [♂, North America.]

1862. *I[schnoptera] nortoniana* Sauss., ibid., p. 169. [[♂], North America.]

1862. *Platamodes pennsylvanica* Scudder, Bost. Jour. Nat. Hist., vii, p. 417. (In part.) [5 ♂: Indiana; Maryland.]

1862. *E[ctobia] flavocincta* Scudder, ibid., p. 419. [♀: Massachusetts; western States; Lake Superior.]

1864. *Ischnoptera pennsylvanica* Saussure, Mém. l'Hist. Nat. Mex., iii, p. 84. [♂, Kansas.]

1864. *Ischnoptera translucida* Saussure, ibid., p. 85. [♂, North America.]

1865. *Ph[yllodromia] borealis* Brunner, Nouv. Syst. Blatt., p. 101. [♂, North America.]

1872. *Temnopteryx marginata* Scudder, Final Rept. U. S. Geol. Surv. Nebr., p. 251. [♀, banks of Platte River.]

1893. *Ischnoptera inaequalis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 36, pl. VI, figs. 14 to 17. [♂, ♀: Texas; North Mexico.]

1894. *Ectobia borealis* Beutenmüller, Bull. Am. Mus. Nat. Hist., vi, p. 261. [♀, New York.]

1894. *Ectobia flavocincta* Blatchley, Proc. Indiana Acad. Nat. Sci., 1892, p. 161. [Marshall, Vigo and Putnam Counties, Indiana.]

[225] The material before us indicates that the majority of males winter in a nearly adult condition, appearing adult very early in the spring. The females probably appear full grown at a decidedly later date, not reaching their greatest abundance until at least the middle of July.

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1910. *Ischnoptera pensylvanica inaequalis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1910, p. 427, figs. 11 and 12. [Western material of intensive coloration.]

This widely distributed species is clearly the most plastic of the genus. The above synonymy has resulted, in part, from failure to recognize as the same species, individuals differing in general appearance and the number of synonymic names has also been augmented by failure to associate the sexes, while in one case immature material was described.

Rehn and Hebard, in 1910, corrected in large part this synonymy, but unfortunately wrongly assigned Saussure's name *couloniana*[226] to the species here properly designated as *P. lata*, and recognized two geographic races in the present species.

A decidedly larger series now before us shows clearly that, although average differences in coloration occur in the western portions of the distribution of *pensylvanica* (an intensive condition there being normal), decided individual variation in size, form, coloration, and, in the female, in degree of reduction in the organs of flight, is everywhere pronounced. Differences in intensity of coloration and, in the female, in degree of tegminal reduction, were given as separating the supposed races, *p. pensylvanica* and *p. inaequalis*. These features the material before us conclusively proves worthless.[227]

[226] Though the original description is very brief, we find an excellent figure given by Saussure without name; Mélang. Orth., i, pl. i, fig. 26, (1863). That author, the following year, gives a full discussion of *couloniana* and refers to this figure of the type of that species, but incorrectly, as fig. 21; Mém. l'Hist. Nat. Mex., iv, p. 83.

In the description, the tegminal width is given as 5 mm. This is decidedly incorrect, as the figure shows, the exact dimensions of the figure being: length of pronotum, 4.7; width of pronotum, 6.3; length of tegmen 24.5; width of tegmen 7.2 mm. That the figure is correct is proven by our series, which show that no North American species, with tegmen 24 mm. or over in length, has the tegminal width under 6 mm. This error was largely responsible for Rehn and Hebard's incorrect association of the name in 1910 and Blatchley's suggestion of its position in 1904.

[227] The western type was said to have the color pattern decidedly contrasted, with discal area of pronotum uniform. Specimens before us from Wildwood Junction, New Jersey; Washington, District of Columbia, and Fredericksburg, Virginia, show a maximum of this condition, while specimens from Dallas County, Iowa, and Osage, Kansas, are strongly recessive and intermediates occur throughout the series. It is true, however, that an intensive coloration is more frequently encountered in western material.

The degree of tegminal reduction, though decided in a greater percentage of western females and in a few from that region showing the maximum, is very considerable in

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Males of the present species are distinctive in the specialization of the median and first dorsal abdominal segments. The median segment is developed similarly to that of *P. divisa*, but without a raised ridge connecting the projections caudad. The first abdominal segment is, however, also similarly specialized in every way, except that the cephalic margin, cephalad of the projections, bears fewer hairs.

Females of this insect are readily separated, in large part, from those of *divisa* by the features stated in the discussion under that species. As we have there remarked, however, rare individuals of the present very plastic form show such close similarity to the extremes of *divisa* toward the present type, that, even considering the sum total of usual differences, correct determinations are in such cases extremely difficult.

Characters of Male.—(Philadelphia, Pennsylvania.) Size very large, form moderately broad. Interocular space distinctly less than that between antennal sockets.[228] Ocelli well defined. Inter-ocular-ocellar area flattened,[229] with surface microscopically roughened. Pronotum with greatest width (normally) mesad,[230] but with lateral margins, from this point, slightly more convergent cephalad than caudad; oblique sulci of disk strongly defined. Tegmina and wings fully developed, normal; tegmina with lateral margins subparallel in mesal two-thirds; wings (in the series) with no to four incomplete and six to eight complete rami of the ulnar vein.[231] Median segment supplied mesad with two decided ridges which are weakly convergent cephalad, with their cephalic extremities overhanging the cephalic portion of the segment, which is there and between rather strongly concave; ventral faces of overhanging extremities heavily clothed with short hairs, the narrow ridge of the cephalic margin of the segment mesad furnished with numerous hairs. First dorsal abdominal segment similarly specialized in every way, except that the cephalic margin is supplied with fewer hairs. Sixth dorsal abdominal segment with distal

females from Sunbury and Lake Wesauken, Pennsylvania, and to a less degree in three from the Black Mountains of North Carolina. In the western series, the less reduced tegminal condition, through rare, is sometimes found.

[228] Variable in the series; slightly greater than (more usual), to slightly less than, the interocellar width.

[229] Very often unevenly weakly concave.

[230] Occasionally slightly caudad of this point.

[231] The veins in this species show greater irregularities than in any other of the genus. Frequently the rami of the ulnar vein branch near the distal margin of the wing; while in one specimen this is also true of the median vein, which branches twice in one wing and once in the other. A single specimen has no incomplete rami of the ulnar vein, but numbers have but a single incomplete ramus.

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margin transverse; seventh with surface moderately convex and with distal margin convex but truncate mesad, thus concealing (in normal position) all but lateral margins of eighth segment and proximo-mesal portion of supra-anal plate. Supra-anal plate with free margin between the cerci convex, but (normally) showing feeble angulations disto-laterad.[232] Cerci elongate and slender, with disto-lateral angles of proximal joints slightly produced[233] and lateral margins moderately crenate distad. Genital hook very short and broad, with distal half sharply recurved, elongate oval and tapering to acute apex. Subgenital plate much as in *divisa*. Exposed folded ventral portion of eighth dorsal abdominal segment extremely variable in the series, in length (normally) less than that of exposed portion of seventh ventral abdominal segment.

Characters of Female.—(Mount Airy, Philadelphia, Pennsylvania.) Size large, form decidedly robust. Head larger and more evenly rounded than in male, with face slightly more deplanate than in this sex of the species of the genus, except *divisa*.[234] Interocular space (in the series) slightly less than (normal) to slightly greater than that between antennal sockets. Pronotum more ample and decidedly wider than in male, with greatest width near caudal margin and latero-caudal angles much more sharply rounded; sulci of disk subobsolete.[235] Tegmina reduced, covering (normally) more than half the dorsal surface of the abdomen.[236] Sixth dorsal abdominal segment broadly and feebly concave laterad, broadly but more decidedly convex mesad. Supra-anal plate (normally) with lateral margins nearly straight, convergent, showing a slight concavity just beyond bases of cerci, to the rather sharply rounded apex.[237] Cerci shorter than, but otherwise much as, in male.[238] Subgenital plate strongly convex, with distal margin very broadly rounded and feebly irregular.

[232] Even greater variation than in *divisa* is found, and although the condition described above is the more usual in the series before us, it is evident that in large series individuals will be found with this plate ranging from convex-truncate to evenly convex and convex-trigonal.

[233] In the majority of western specimens these angles are decidedly produced, as much as in *uhleriana*. In the present species, however, this is not sufficiently constant to warrant recognition, except as an interesting individual variation having some geographic significance.

[234] See footnote 216.

[235] In many females of the series before us, the sulci of the pronotal disk have entirely disappeared.

[236] Every degree occurs from a decidedly reduced type (particularly in material from Iowa and Nebraska to Texas) in which the tegmina are but little longer than the pronotum, to a partially caudate type (one specimen; Natchez, Mississippi) in which the sinistral tegmen alone extends well beyond the apices of the cerci, but is not as ample as in the male.

[237] In the supra-anal plate, the lateral margins vary to a condition in which they are concave in large portion, the apex varying from bluntly to sharply rounded.

[238] See footnote 233.

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Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Montreal, Quebec		22	4.8	5.9	22.7	6.4
Lakehurst, New Jersey		19.7	4.2	5.4	20.2	5.8
Philadelphia, Pennsylvania		20	4.8	6	23.1	6.4
Great Falls, Virginia		21	4.8	6.7	24.6	7
Asheville, North Carolina	(2)	20–21.7	4.6–4.8	6–6.2	22.4–23.9	6.4–6.3
Richmond, Indiana	(3)	18.5–19.5	4.2–4.8	5.8–6.1	24.1–24.3	6.4–7.7
Hurricane Mills, Tennessee	(3)	22–21.5	5–5.3	6.4–6.9	22.5–25.1	6.3–7.1
Decatur, Alabama		20.4	4.7	5.9	19.9	6.2
Natchez, Mississippi		18.2	4.7	5.7	19.5	5.8
South Bend, Missouri	(2)	19.8–19.4	4.8–4.9	6.3–5.8	21.7–23.3	6.2–6.4
Atoka, Oklahoma		17.2	4.6	5.5	19.8	5.8
Stillwater, Oklahoma		24.5	5.2	6.5	24.8	6.3
Waco, Texas	(8)	16.8–21.3	4.2–4.8	5.6–6.2	17.3–22.2	5.4–6.4
Extremes in series		16.8–24.5	4.2–5.3	5.4–6.9	17.3–25.1	5.4–7.7
♀						
Montreal, Quebec		17	5.2	6.4	10.7	5.2
Lakehurst, New Jersey	(4)	13–13.5	4.3–4.4	5.4–5.8	9.8–11.7	4.4–4.8
Wildwood Junction, New Jersey	(5)	15–17.5	4.7–5	6.2–6.4	13.7–13.9	5.2–5.2
Sunbury, Pennsylvania		14.5	4.8	6	7.8	4.2
Mount Airy, Pennsylvania	(2)	17–18	4.8–5	6.6–6.8	11.3–12.2	5–5.4
Washington, District of Columbia	(7)	14.5–16.2	4.8–5.8	5.1–6.7	11.4–11.6	5.1–5.2
Great Falls, Virginia	(3)	17–18	5–5.7	6.7–7.2	12–12.2	5.4–5.7
Black Mountains, North Carolina	(3)	16–16.5	4.7–4.8	5.7–5.8	9.3–9.8	4.9–5.3
Clayton, Georgia		15.3	4.4	5.8	11.8	4.7
Marion County, Indiana		15.5	5.1	6.7	11.2	5
Natchez, Mississippi	(3)	16.7–15.2	4.7–4.8	5.7–6.1	16.8[239]–9.8	5.2–4.8
Bloomsboro, Iowa	(2)	12.7–16	4.6–5	5.7–6.3	9.8–7.7	4.5–4.8
Iowa City, Iowa		16.5	4.9	6.2	6.9	4.6
Nebraska City, Nebraska		13.5	4.7	6	6.9	4.5
Osage, Kansas		14.7	4.8	—	10	4.7
Howe, Oklahoma		14.7	4.8	6.3	7.8	4.6
Waco, Texas		14.8	4.7	5.8	6.4	4.2
Extremes in series		12.7–18	4.3–5.8	5.1–7.2	6.4–16.8	4.2–5.7

[239] The sinistral tegmen alone is caudate, a condition found only in this female among the many examples before us. The dextral tegmen is not as unusual, 12.2 mm. in length.

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Biometric and color variations in the present insect are equally striking, both due in large part to individual variation. The extremes of the different types, particularly in the female sex, are so very different in general appearance that little surprise should be felt at the considerable synonymy. Indeed, without large series for illustration, the difficulty would be to convince even the experienced worker that such decidedly different appearing insects represent one and the same species.

Coloration.—♂. (Normal.) (Philadelphia, Pennsylvania.) Head with occiput chestnut; below this, to margin of clypeus, blackish chestnut brown; genae and remaining portions of clypeus cinnamon-buff. Ocelli cream color. Underparts and abdomen heavily suffused with blackish chestnut brown, the latter mesad, and on the proximal segments briefly proximo-laterad, cinnamon-buff. Limbs cinnamon-buff, the ventral femoral and dorsal tibial margins and spines washed with chestnut brown. Pronotum with disk and caudal margin blackish chestnut brown, except mesad, where a narrow, longitudinal, suffused line of hazel occurs; remaining narrow cephalic and broader lateral portions of pronotum warm buff, the lateral portions in large part transparent. Tegmina transparent, heavily washed with cinnamon brown, with marginal field and proximal portions of scapular field very feebly washed with cinnamon brown, proximal portion of humeral vein blackish brown. Dorsal surface of abdomen ochraceous-tawny, heavily suffused laterad and distad (including supra-anal plate and cerci) with blackish chestnut brown. In the maximum recessive condition the browns are all more dilute and occasionally the disk of the pronotum is alone darkened.[240] (Maximum intensive.) (Waco, Texas.) Head, underparts and limbs cinnamon brown, the limbs more solidly of a darker shade. Abdomen blackish chestnut brown. Pronotum dark chestnut brown from narrow area on cephalic margin expanding through disk to and including entire caudal margin, lateral margins sharply defined in warm buff. Tegmina translucent, deep cinnamon brown, with marginal field sharply defined in light buff. Dorsal surface of abdomen

[240] In this condition resembling more closely males of *divisa* in general coloration.

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tawny, heavily suffused with dark cinnamon brown. Numerous differences in shade and contour[241] of the markings is shown by the series before us, linking up in every way the extremes. The southwestern material averages near the maximum intensive, but in all series individual differences are found.

♀. (Maximum recessive.) (Staten Island, New York.) Head with vertex ochraceous-buff, below with a vertical blackish chestnut brown band, which is narrowest below the antennal sockets, ocellar spots and genae warm buff. Underparts and limbs antimony yellow, the former mottled with blackish brown; ventral surface of abdomen mesad cinnamon brown, with broad lateral margins of suffused antimony yellow and subgenital plate suffused ochraceous-tawny. Pronotum with disk heavily clouded with russet, which shades into the narrow cephalic and broader lateral margins of ochraceous-tawny.[242] Every gradation is found from this to the following condition. (Normal eastern, occasional western.) Browns darker and more solid. Disk of pronotum mars brown, this marking continued to and including all of the caudal margin of the pronotum, but with a medio-longitudinal streak of tawny; this marking not sharply defined from the moderately broad cephalic and broader lateral margins of the pronotum, which are antimony yellow. Tegmina translucent mars brown, with marginal and proximal portions of scapular fields much paler, warm buff, the latter suffused. Dorsal surface of abdomen blackish brown, the segments margined with ochraceous-tawny laterad to individually variable degrees. Many intermediates in the series connect this with the following striking type. (Maximum intensive.) (Rare eastern, frequent northwestern, normal southwestern.) Head blackish chestnut brown, except ocellar spots and lateral portions of genae, which are antimony yellow. Underparts and limbs cinnamon brown, ventral surface of abdomen blackish chest-

[241] Two distinct types of pronotal marking occur, these particularly striking in the maximum intensive coloration. In one, the lateral margins of the dark area are nearly straight; in the other, these margins bordering the disk of the pronotum are there decidedly convex.

[242] Such females are the most difficult to separate from those of *divisa*. But one other specimen before us, from Lakehurst, New Jersey, shows this degree of recession, the genae, however, being much suffused with dark brown.

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nut brown, shading to russet meso-proximad. Pronotum solid blackish chestnut brown, except lateral margins, which are sharply defined in antimony yellow. Tegmina translucent blackish chestnut brown, with marginal fields sharply defined in warm buff.

Many of the young of this species before us are uniform blackish chestnut brown, occasional specimens are paler brown, while in the series from Thomasville, Georgia, the lateral margins of pronotum, mesonotum and metanotum are strikingly pale buffy. This is shown to a lesser degree in one from Natchez, Mississippi, and weakly on the pronotum in a number of immature eastern examples.

We find that the ootheca is carried with suture directed either dorsad or laterad. Females before us with ootheca in the former position are from Montreal, Quebec, and Steuben County, Indiana: in the latter position from Jamesburg, New York; Harrisburg, Pennsylvania, and Natchez, Mississippi. The ootheca has its sides rather strongly convex as in *divisa*, with surface smooth and serrations of suture slightly lower and wider than in that species. It averages decidedly longer than in any other species of the genus except *lata* (Harrisburg, Pennsylvania, 10.2 by 4.2 mm.).

The present species has the widest distribution of any of the genus in the United States, covering more than the eastern half of this country and extending into southern Canada. Its northernmost known limits are Scarboro, Maine; Abbotsford and Montreal, Quebec; Sudbury, Ontario; Saginaw Bay, Michigan and the south shore of Lake Superior, and Polk County, Wisconsin. The westernmost records are Valentine, Nebraska; Clearwater, Kansas, and Byers, Waco and Brownsville, Texas. Southeastward the species is not as yet known beyond Raleigh, North Carolina; Spartanburg, South Carolina, and Thomasville, Georgia.

Specimens Examined: 199; 75 males, 77 females and 47 immature individuals.
Montreal, Quebec, (Caulfield), 1 ♂, 1 ♀ with ootheca, [M. C. Z.].
Prout's Neck, Maine, 3 ♀, [M. C. Z.].
Winthrop, Massachusetts, (Mrs. H. E. Scudder), 1 ♂, [M. C. Z.].
Staten Island, New York, VI, (W. T. Davis,) 1 ♂, [Hebard Cln.]; 1 ♀, [Davis Cln.].
Jamesburg, New Jersey, VI, 22, , (W. T. Davis), 1 ♀ with ootheca, [Davis Cln.].

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Lakehurst, N. J., VI, 14, 1908, (W. T. Davis), 1 ♂; VII, 11 to VIII, 15, 1911, (W. T. Davis), 4 ♀, [all Davis Cln.].

Stafford's Forge, Ocean County, N. J., VIII, 30, 1914, (Rehn; in oak and pine woods), 1 ♀, [A. N. S. P.].

Da Costa, N. J., VII, 29, 1904, (E. Daecke), 1 ♀, [Hebard Cln.].

Wildwood Junction, N. J., VII, 28 to VIII, 14, 1914, (Hebard; trapped, molasses jars in oak forest), 5 ♀, [Hebard Cln.].

Lake Weassanking, Bradford County, Pennsylvania, (J. Willcox), 2 ♀, [A. N. S. P.].

Ivy Hill, Mount Airy, Pa., VI, 12 to 30, 1914, (Hebard; trapped, molasses jars in chestnut forest), 2 ♀; VII, 1 to 11, 1914, (Hebard; same data), 1 juv. ♂, [all Hebard Cln.].

Tulpehocken, Pa., VII, 1 to 11, 1914, (Hebard; trapped, molasses jar on knoll with high deciduous trees), 1 ♀, [Hebard Cln.].

Wissahickon and Lincoln Drives, Philadelphia, Pa., VI, 4 to 9, 1914, (Hebard; trapped, molasses jar in heavy ravine forest), 1 ♀, [Hebard Cln.].

West Philadelphia, Pa., VI, 9, 1 ♂,]A. N. S. P.].

Danville, Pa., V, 29, 1 ♂, [Pa. State Dept. Zool.].

Fisher's Ferry, Pa., V, 29, 1 ♂, [Pa. State Dept. Zool.].

Sunbury, Pa., VII, 1 ♀, [M. C. Z.].

Rockville, Pa., I, 26, 1913, 1 juv., [Pa. State Dept. Zool.].

Harrisburg, Pa., VII, 18, 2 ♀, 1 with ootheca, [Pa. State Dept. Zool.].

Camphill, Pa., V, 23, 1 ♀, [Pa. State Dept. Zool.].

Gettysburg, Pa., IV, 22, 1 juv. ♂, 1 juv. ♀, [A. N. S. P.].

McConnellsburg, Pa., VI, 4, 1905, 1 ♂, [A. N. S. P.].

Transfer, Pa., IV, 1, 1908, 1 juv. ♀, [Pa. State Dept. Zool.].

Beatty, Pa., (O. Brugger), 1 ♀, [A. N. S. P.].

Penn Station, Pa., V, 29, 1905, 2 ♂, [A. N. S. P.].

Laurel, Delaware, VI, 7, 1908, (B. Long), 1 ♂, [A. N. S. P.].

Chestertown, Maryland, VIII, 1, 1904, (E. G. Vanatta), 1 ♀, [A. N. S. P.].

High Island, Md., VII, 1, 1904, (A. N. Caudell), 1 ♀, [U. S. N. M.].

Glendale, Md., VII, 3, (Mrs. Nellie Caudell), 1 ♀, [U. S. N. M.].

Washington, District of Columbia, VI, 2 to 29, (W. T. Davis; 4 ♀ trapped, molasses jar), 2 ♂, 7 ♀, [U. S. N. M., Davis and Hebard Clns.].

Great Falls, Virginia, VI, 27, 1911, (W. T. Davis), 1 ♂, 3 ♀, [Davis Cln.].

Alexandria County, Va., IX, 1911, (W. T. Davis; trapped, molasses jar), 1 juv. ♂, [Hebard Cln.].

Falls Church, Va., VII, 28, 1 ♀, [U. S. N. M.].

Fredericksburg, Va., VII, 20, 1913, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Nelson County, Va., VI, 21, 1914, (W. Robinson), 1 ♂, [U. S. N. M.].

Hot Springs, Bath County, Va., 2400 feet, VIII, 3 to 25, 1916, (Hebard; night, attracted to molasses on chestnut and white oak trunks,) 1 ♀, 9 juv.,[243] [Hebard Cln.].

[243] Kept alive, active and considerably larger, June, 1917.

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Deer Lick Mountain, Bath County, Va., 2800 feet, VII, 10, 1916, (Hebard; under bark of decaying chestnut log), 2 oothecae, [Hebard Cln.].

Collison Ridge, Bath County, Va., 2800 feet, VII, 5, 1916, (Hebard; under bark of dead chestnut stump), 1 ♀ with ootheca; VII, 8 to 14, 1916, (Hebard; trapped molasses jar), 1 ♀, [both Hebard Cln.].

Montgomery County, Va., V, 26, 1899, (E. A. Smyth Jr.), 1 ♂, [Hebard Cln.].

Wellsburgh, West Virginia, 1910, (Mrs. Green), 1 ♂, [U. S. N. M.].

Raleigh, North Carolina, VI, 2, 1904, (C. S. Brimley), 1 ♂, [Hebard Cln.].

Black Mountains, N. C., V, 31 to VI, 6, 1912, (W. Beutenmüller), 3 ♀, [Cornell Univ. Cln.].

Sulphur Springs, Buncombe County, N. C., 2500 feet, V, 25 and 30, 1904, (Hebard), 2 ♂, [Hebard Cln.].

Spartanburg, South Carolina, VIII, 6, 1913, (Hebard; under signs on trees), 1 ♀, 5 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Clayton, Georgia, V, 18 to 26, 1911, (J. C. Bradley), 1 ♂, [A. N. S. P.]; VI, 1909, (W. T. Davis), 1 ♀, [Hebard Cln.].

Thomasville, Ga., III, 23 and IV, 9, 1904, (Hebard; under signs on oaks), 7 juv. ♂, [Hebard Cln.].

Sudbury, Ontario, (D. H. Haight), 2 ♂, [Bklyn. Inst.].

Meigs County, Ohio, (Samuels), 1 ♂, [M. C. Z.].

Richmond, Indiana, (J. A. Allen), 3 ♂, [M. C. Z.].

Crawford County, Ind., VII, 2, 1902, (W. S. Blatchley), 1 ♂, [Hebard Cln.].

Marion County, Ind., V, 30, 1897, (W. S. Blatchley), 1 ♀, [Hebard Cln.].

Steuben County, Ind., VIII, 11, 1903, (W. S. Blatchley), 1 ♀, [Hebard Cln.].

Ogle County, Illinois, (J. A. Allen), 1 ♂, [M. C. Z.].

Mossville, Ill., V, 1889, (F. Blake), 1 ♂, 1 juv. ♂, [M. C. Z.].

White Heath, Ill., VI, 17, 1911, 1 ♀, [Hebard Cln.].

Carbondale, Ill., VI, 25, 1909, (at light), 1 ♂, [U. S. N. M.].

Western States, (A. Agassiz), 2 ♂, 1 ♀, latter *cotype* of *Ectobia flavocincta* Scudder, [M. C. Z.].

Michigan, 1 ♂, [Davis Cln.].

Lake Superior, (A. Agassiz), 1 ♀, *cotype* of *Ectobia flavocincta* Scudder, [M. C. Z.].

Cranmoor, Wisconsin, VI, 5, 1910, (C. W. Hooker), 1 ♀, [U. S. N. M.]; VII, 7, 1909, (C. B. Hardenberg), 1 ♂, [A. N. S. P.].

Polk County, Wis., VII, (C. F. Baker), 1 ♂, [A. N. S. P.].

Madison, Wis., V, 10, 1915, (A. C. Burrill), 1 ♂; IX, 20, 1916, (L. G. Gentner), 1 juv. ♂, [both Wisc. Agr. Exp. Sta. Cln.].

Dodgeville, Wis., VI, 10, 1914, (at light), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

Lancaster, Wis., VI, 8, 1914, (at light), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

Minnesota, V, 1 ♂, [Hebard Cln.].

Ramsey County, Minn., VII, 2, 1 ♂, [Minn. Dept. Agr. Cln.].

Gray Cloud, Minn., VIII, 15, 1895, 1 ♀ with ootheca, [Minn. Dept. Agr. Cln.].

Nashville, Tennessee, VI, 9, 1914, (G. G. Ainslie; at light), 1 ♂, [U. S. N. M.].

Hurricane Mills, Tenn., (G. G. Ainslie), 3 ♂, [U. S. N. M.].

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Decatur, Alabama, (B. Shimek), 1 ♂, [Hebard Cln.].
Brookfield, Missouri, (E. P. Austin), 1 ♀, [M. C. Z.].
St. Louis, Mo., VI, 10, 1904, (W. V. Werner), 1 ♂, [U. S. N. M.].
Mountain Grove, Mo., IV, 7, 1916, (M. P. Somes), 3 juv. ♂, [Somes Cln.].
Natchez, Mississippi, V, 20 to VI, 3, 1909, (E. S. Tucker; 2 at sugar, 1 in dead oak) 3 juv. ♀; VI, 7 to 10, 1909, (E. S. Tucker; ♂ at light, ♀ ♀ at sugar), 1 ♂, 3 ♀, [all U. S. N. M.].
Logansport, Louisiana, VI, 6, 1906, (W. D. Pierce), 1 ♂, [U. S. N. M.].
Muscatine, Iowa, V, 17, 1909, (M. P. Somes), 1 ♂, [Somes Cln.].
Fruitland, Ia., VI, 17, 1915, (M. P. Somes), 1 ♀, 1 juv. ♀, [Somes Cln.].
Iowa City, Ia., VIII, (B. Shimek), 1 ♀, [Hebard Cln.]; IX, 10, 1910, (M. P. Somes), 1 ♂, [Somes Cln.].
Des Moines, Ia., VIII, 21, 1908, (M. P. Somes), 2 ♂, [Somes Cln.].
Dallas County, Ia., VIII, 4, (J. A. Allen; in rotten logs and stumps), 2 ♀, [M. C. Z.].
Bloomsboro, Ia., VII, 1867, (J. A. Allen), 2 ♀, [M. C. Z.].
Valentine, Nebraska, VIII, 1888, 1 ♀, [Hebard Cln.].
Badger, Nebr., 1 ♀, [Hebard Cln.].
South Bend, Nebr., III, 11, 1910, (L. Bruner), 2 ♂; 3 juv. ♂, 3 juv. ♀, [all Hebard Cln.].
Lincoln, Nebr., VI, (L. Bruner; at light), 1 ♂, [Hebard Cln.].
Nebraska City, Nebr., VI, 1 ♂, 1 ♀, [Hebard Cln.].
Platte River, (Hayden), 1 ♀, *type* of *Temnopteryx marginata* Scudder, [M. C. Z.].
Hiawatha, Kansas, VIII, 1904, (F. B. Isely), 1 ♀, [U. S. N. M.].
Topeka, Ks., (F. W. Cragin), 2 juv. ♂, [Hebard Cln.].
Osage, Ks., (Stolley), 1 ♂, 1 ♀, [M. C. Z.].
Independence, Ks., (A. Birchfield), 1 ♂, [Hebard Cln.].
Stillwater, Oklahoma, (A. N. Caudell), 1 ♂, [U. S. N. M.].
Howe, Okla., VIII, 4, 1905, (A. P. Morse), 1 ♀, [Morse Cln.].
Atoka, Okla., VII, 29, 1905, (F. C. Bishopp), 1 ♂, [U. S. N. M.].
Byers, Texas, VII, 1910, (F. B. Isely), 1 ♀, [U. S. N. M.].
Dallas, Tex., (J. Boll), 2 ♂, [M. C. Z.].
Waco, Tex., V, 5 to VII, 16, (Belfrage; coming to light at night, not common), 8 ♂, 1 ♀, [M. C. Z.].
Esperanza Ranch, Brownsville, Tex., V, 25, (C. Schaeffer), 1 ♂,[344] [Bklyn. Inst.].

SYMPLOCE Hebard

1916. *Symploce* Hebard, Trans. Am. Ent. Soc., xlii, p. 355.

This genus differs from both *Ischnoptera* and *Parcoblatta*, in the weak but evident mesal production of the caudal margin of the pronotum, even convexity of the same without discal sulci, even in individuals having fully developed tegmina and wings, longi-

[344] Recorded incorrectly by Caudell as *couloniana*.

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tudinal discoidal sectors of the tegmina, strikingly bifurcate discoidal vein of both tegmina and wings, type A armament of ventro-cephalic margins of cephalic femora and differently specialized dorsal abdominal segments and styles in males.

Five species in addition to the genotype are known, all of which are confined in distribution to the West Indies except the species here considered.

GENOTYPE, by original designation: *Symploce capitata* (*Ischnoptera capitata*) (Saussure).

Generic Description.—Pronotum much as in *Ischnoptera*, except that the disk is smooth and evenly convex without sulci, and the caudal margin is weakly obtuse-angulate produced with broadly rounded apex mesad. Tegmina and wings fully developed.[245] Tegmina with discoidal sectors (these including branch of discoidal vein, median and ulnar veins and their branches; the ulnar vein normally showing more branches than the median vein) longitudinal. Wings with area between discoidal vein and anterior margin moderately narrow, slightly broader than in *Ischnoptera*, the width greatest a little distad of the mesal point. Mediastine vein extending slightly more than half the distance to the apex of the wing, from which vein spring a number of the costal veins; none of the costal veins enlarged. Discoidal vein dividing mesad, the two portions equally decided and showing only inconspicuous distal furcations; a number of weak, well-spaced, nearly perpendicular veinlets connect this vein with the median vein. Ulnar vein weakly curved, with few (one to three) incomplete proximal rami and more (four to five) distal rami extending to the margin of the wing. Intercalated triangle small. Median segment of males specialized.[246] When other specialization of the dorsal abdominal segments occurs in males, this is confined to the sixth and eighth segments; no appendages occur as in *Ischnoptera*. Male subgenital plate asymmetrical, with variously highly specialized styles. Cephalic femora with ventro-cephalic margins armed with rather heavy elongate spines, which decrease gradually in length mesodistad and are terminated distad by three longer (in increasing

[245] Except in the female of *lita*.

[246] Except in *lita*.

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ratio) distal spines. Other ventral margins of femora furnished with not numerous, heavy, elongate spines. Median and caudal femora, in addition, supplied with a single, elongate, heavy genicular spine. Pulvilli as in *Parcoblatta*. Small arolia present.

All of the species of this genus known to us are pale in general coloration; buffy, in some species moderately to strongly tinged with ochraceous. Distinctive characters of coloration are entirely lacking in nearly all of the forms.

Symploce lita Hebard (Plate II, figures 16 to 20.)

1916. *Symploce lita* Hebard, Trans. Am. Ent. Soc., xlii, p. 357, pl. XVII, fig. 8, pl. XVIII, figs. 1, 2, 3 and 4. [♂, ♀; records listed in present paper.]

The characters given above to separate the present genus from *Ischnoptera* and *Parcoblatta*, readily separate males of the present species from those of any other found over the regions at present under consideration. In the present genus this species is anomalous in the males having the median segment unspecialized and the supra-anal plate, subgenital plate and styles of an entirely different type from those of the males of the other species of the genus.

In the female the tegmina are decidedly reduced, subquadrate, with characters of venation obliterated; thus differing widely from the other known species of the genus, the females of all of which have the tegmina fully developed. This tegminal reduction in the present species gives females a distinct, though superficial, resemblance to females of *Parcoblatta virginica*.

Type.—♂; Key West, Florida. July 4, 1912. (M. Hebard.) [Hebard Collection, Type No. 423.]

Description of Type.—Very similar in general structure to *S. jamaicana*, size medium small, slightly larger than in that species; form moderately slender, as in *jamaicana;* slightly more slender than in *S. capitata*. Head with eyes large, larger than in *jamaicana* or *capitata*. Interocular space three-fifths as wide as interocellar space. Ocelli distinct, with surfaces flat and almost perpendicular to the plane of the interocellar area, their margins there sharply rounded. Maxillary palpi with third and fifth (distal) joints subequal in length, fourth joint slightly shorter. Pronotum of same form as in *capitata* but proportionately deeper. Tegmina and wings fully developed, as given in generic description, structure of same very delicate. Median segment unspecialized. Sixth dorsal abdominal segment with two moderately deep, small, meso-proximal depressions, between which it is

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triangularly raised with apex proximad, this portion thickly clothed with hairs, caudal margin of segment rather strongly concave; seventh segment concealed, except narrowly laterad; eighth segment with narrow distal portion exposed, distal margin strongly concave. Supra-anal plate transverse, not extending to distal extremity of subgenital plate, lateral margins strongly convergent and rounding into the broadly transverse mesal portion, lateral margins furnished with a well spaced row of minute, chitinous spines. Cerci slender, lateral margins crenate, with eleven and twelve distinct joints, dorsal surface flattened, ventral surface convex. Subgenital plate weakly produced, asymmetrical; dextral free margin produced oblique, nearly straight but strongly upcurved to just beyond mesal point, there supplied with a minute, stout projection (style), with apex flat and margin slightly produced sinistrad, at the dextral base of which is a sharp, chitinous, curved spine of equal length, sinistrad of this point the margin is sharply and briefly concave, from which springs a projection (style) which is over twice as long but more slender than the dextral style, curved dextrad, with apex tapering and armed meso-distad with two minute, chitinous spines, beyond this the sinistral portion of the free margin is straight, transverse. Limbs and armament of same as given in generic description.

Allotype.— ♀ ;[247] San José del Cabo, Lower California, Mexiço. [Hebard Collection.]

Description of Female.—Similar to type in ambisexual characters, differing very decidedly in the following features. Head with eyes distinctly smaller; interocular space very broad, slightly broader than space between antennal sockets. Ocelli weakly defined, with ocellar area not as deep as in male and rounding more evenly into interocellar area. Pronotum with caudal margin very weakly angulato-produced.[248] Tegmina greatly reduced, subrectangulate, transversely truncate at apex of anal field, with a weak concavity in discoidal field, distal angle on costal margin broadly rounded, distal angle on sutural margin rectangulate and sharply rounded, sutural margins straight and overlapping. Wings shorter than tegmina, greatly atrophied, but with anterior and posterior fields still defined. Supra-anal plate triangularly produced; lateral margins nearly straight, very weakly and broadly concave; apex blunt, but evenly rounded. Subgenital plate convex, very weakly produced, with free margin weakly convex, except at base of cerci, where a very weak, broad concavity is apparent.

The remaining males and females from Lower California show scarcely any variation in structure from those described.

[247] The present species is domiciliary and apparently widely distributed through the North American tropics.

[248] This is another case of the caudal margin of the pronotum showing truncation in the sex exhibiting reduction in the organs of flight.

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Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida, *type*	14	3.6	4.6	12.8	3.6
San José del Cabo, Lower California	11.5	3.2	3.7[249]	11.1	3.1
San José del Cabo, Lower California	12.7	3.7	4.2	12.7	3.7
♀					
San José del Cabo, Lower California, *allotype*	12.3	3.7	4.6	4.1	3.1
San José del Cabo, Lower California	11.4	3.7	4.3	4.8	3
San José del Cabo, Lower California	11	3.4	4.1	3.9	3.1

Coloration.—♂. Translucent ochraceous-tawny, eyes dark mummy brown, median portion of face ochraceous-tawny. Limbs and abdomen ochraceous-buff, the latter shading to tawny distad. Cerci ochraceous-tawny. The males from Lower California are paler, due to alcoholic bleaching. This must be considered likewise in the females from that locality, which are chestnut to hair brown on head and abdomen, the pronotum and tegmina slightly paler, kaiser brown to hazel. The tegmina are translucent and, in two specimens, very slightly paler than the pronotum.

Specimens Examined: 7; 4 males and 3 females.

Key West, Florida, VII, 4, 1915, (Hebard; in cupboard of hotel with swarms of *Blattella germanica* and a few *Supella supellectilium*), 1 ♂,[250] *type*, [Hebard Cln.].

Vera Cruz, Vera Cruz, Mexico, (A. Sallé), 1 ♂, [Hebard Cln.].

San José del Cabo, Lower California, Mexico, 2 ♂, 3 ♀, *allotype*, (dried alcoholic), [Hebard Cln.].

The Group Pseudomopites

The species discussed below is the only form of this group found in the regions at present under consideration. In consequence, we have here not felt called upon to study the forms of the group, or determine their proper arrangement as fully as has been necessary for the Group Blattellites and Ischnopterites.

[249] Shrivelling, due to drying after immersion in alcohol, has caused some reduction in this dimension in a number of Lower California specimens.

[250] Recorded incorrectly by Rehn and Hebard as *Ischnoptera rufescens* (Beauvois) (=*I. rufa rufa*), (1914).

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The Group Pseudomopites includes species nearly all of which are very brilliantly colored. The eyes show a tendency to bulge latero-dorsad, this greatly developed in the genus *Pseudophyllodromia*. The antennae in some genera are plumose to varying degrees in different species. The tegmina and wings are glossy. The tegmina are narrow, and in many genera show the median width less than the width elsewhere, the discoidal sectors are longitudinal, in some genera radiating slightly distad; a striking condition is developed in certain genera, in which these sectors form a distinct angle at the apex of the anal field, either in their direction or with the ulnar vein. The wings have few rami of the ulnar vein, these complete.

PSEUDOMOPS Serville

1831. *Pseudomops* Serville, Ann. Sci. Nat., xxii, p. 41.
1838. *Thyrsocera* Burmeister, Handb. Ent., ii, abth. ii, pt. I, p. 498. (In part.)

The present genus is not as widely separated from *Pseudophyllodromia* as has been supposed, and should be placed after, not before, that genus, in linear arrangement.

The genus apparently splits into two very distinct groups, while these again divide into minor groups. Of these latter, it would appear that, of the species before us, *septentrionalis*, *discoidalis* and *intercepta* (all North and Central American) are members of one group, while *oblongata*,[251] *affinis*, *angusta* and *annulicornis* (all South American) are members of another. The species of the first group are broader, with broader tegmina and less plumose antennae, than those of the second. Between these groups, the Mexican *cincta* should be placed; having antennae as in the first, but form and tegmina as in the second.

The numerous described species of this genus are confined to tropical America, with the exception of *septentrionalis*, here described. We are not satisfied that the complex does not include several genera, but in any case we are convinced that the species described below is congeneric with the genotype.

[251] We have, unfortunately, no material of *oblongata* before us, or in fact any specimens of the genus from Surinam, the locality from which it was described. From study of the Linnaean and DeGeerian descriptions and figure, however, we are satisfied that the position of this species, the genotype, is as indicated here.

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GENOTYPE by monotypy: *Pseudomops oblongata* [*Bl*[*atta*] *oblongata*] (Linnaeus).[252]

Generic Characters.—Eyes showing a tendency to bulge laterodorsad. Ocellar areas and ocellar spots weakly defined. Antennae, in proximal half, hirsute to plumose. Pronotum considerably obtuse-angulate produced caudad, with apex rounded. Tegmina narrow, with point of least width mesad; discoidal sectors longitudinal, these formed by the median vein and one ramus, which is angled opposite apex of anal field and rami of ulnar vein which spring at an angle from that vein near the apex of the anal field,[253] (the veins which spring from this region numbering three to six). Wings narrow, hyaline, with glassy, iridescent luster; costal veins heavily clubbed distad, this area strongly suffused; intercalated triangle small. Dorsal surface of male abdomen and styles strongly specialized. Limbs elongate and slender; ventro-cephalic margin of cephalic femora armed with few heavy, elongate spines proximad, followed by one or two shorter spines, succeeded by a row of more closely set, stout, shorter spines, which is terminated distad in three elongate spines in increasing ratio; ventro-

[252] Serville refers to the Linnaean species in his generic description, and whether or not the insect before him was correctly determined, has no effect upon the fact that *oblongata* of Linnaeus is the genotype of *Pseudomops*. Kirby has, in error, given *intercepta* of Burmeister as the type of the genus, placing *oblongata* as understood by Serville in the synonymy under that species (Syn. Cat. Orth., i, p. 75, (1904)). This action is unwarranted and erroneous; because Serville gives first a reference to Linnaeus in his description of the genus, and also gives the locality Surinam, while Kirby himself assigns to *intercepta* only Central American localities. Shelford (see papers—Trans. Ent. Soc. London, 1906, p. 252, (1906) and Trans. Ent. Soc. London, 1907, p. 458 (1908)), has supported Kirby in the view that *oblongata* of Linnaeus and of Serville represent distinct forms, that of the latter author being the same as Burmeister's *intercepta*. We do not agree with this conclusion and believe that *oblongata* of Linnaeus and Serville, both described from material from Surinam, represent probably the same species—certainly both are distinct from the Central American *intercepta* of Burmeister.

[253] The ulnar vein, at the apex of the anal field, reaches a small area where all the veins are subobsolete; from this area spring, at an angle to the ulnar vein, veins which have been termed its rami. It would appear to us, however, that, though the first one or two of these veins constitute continuations of the ulnar vein, the remaining veins, toward the sutural margin, are rather continuations of the axillary veins, which have been broken for a brief distance at the apex of the anal field by the anal sulcus. (See Pl. VI, fig. 5.)

These veins radiate slightly distad, due to the greater width there of the surface which they occupy; the vein adjacent to the sutural margin, however, parallels it for its entire length.

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caudal margin of cephalic femora and ventral margins of other femora heavily spined. Tarsi elongate, four proximal joints each bearing a small distal pulvillus. Small arolia present.

Pseudomops septentrionalis new species (Plate VI, figures 5 to 8.)

1900. *Thyrsocera cincta* Scudder, (not of Burmeister, 1838),[254] Proc. Davenport Acad. Nat. Sci., viii, p. 7. [[♂, ♀]: Texas.]

1904. *Thyrsocera cincta* Caudell, (not of Burmeister, 1838), Mus. Brooklyn Inst. A. & S., Sci. Bull., i, p. 105. [♂: Topo [Stage station near Brownsville], Texas.]

1907. *Pseudomops oblongata* Rehn, (not *Blatta oblongata* Linnaeus, 1758),[255] Ent. News, xviii, p. 209. [♀: Brownsville, Texas.]

1913. *P[seudomops] intercepta* Caudell, (not of Burmeister, 1838), Proc. U. S. Nat. Mus., xliv, p. 603. (Altering record of *oblongata* from the United States.)

That the present species has in the past not been recognized as undescribed, is due to the fact that, at the time the previous records were made, insufficient material of the more southern species was at hand.

The present insect is very closely related to *P. intercepta*,[256] differing from that species in the pronotal coloration (which never shows the distinctive pattern usual in the Mexican insect), slightly

[254] 1838. *Th[yrsocera] cincta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 499. [Mexico.] Compared with *P. septentrionalis* this species is found to have also non-spatulate cerci and non-plumose antennae, but is smaller, distinctly more slender, with black antennae not annulate, pronotum less transverse, distinctly narrower tegmina marked mesad with a dark longitudinal intramarginal stripe and distinctive primary and secondary male sexual features. These observations are based on three males before us from Orizaba, Vera Cruz, Mexico, which have been correctly recorded by Rehn.

[255] 1758. *B[latta] oblongata* Linnaeus, Syst. Nat., Ed. X, i, p. 425. [America.] This species is not at all closely related to *P. septentrionalis*, as it belongs to a different group of species, showing likewise non-spatulate cerci, but decidedly more slender in form, with plumose antennae. The peculiar pronotal markings and plumose antennae are described by Linnaeus; De Geer later figures the species showing plainly these characters, his material coming from Surinam and almost certainly from the same series as the type, as has been pointed out by Shelford, Trans. Ent. Soc. London, 1907, p. 457, (1908).

[256] 1838. *Bl[atta] intercepta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 497. [Mexico.]

The comparisons here made are based on the following specimens of this species.

Distrito Federal, Mexico, (J. R. Inda), 2 ♂, 2 ♀, [U. S. N. M.].

San Rafael, Vera Cruz, Mexico, (C. H. T. Townsend), 1 ♂, 5 ♀, [Hebard Cln.].

Orizaba, Vera Cruz, Mexico, I, 1892, 2 ♂, 1 ♀, [Hebard Cln.]; I, 9 to 16, 1892, (H. Osborn), 2 ♀, [U. S. N. M.].

Cordoba, Vera Cruz, Mexico, VI, 10 and 11, 1908, (F. Knab), 1 ♂, 1 ♀, [U. S. N. M.].

Vera Cruz, Vera Cruz, Mexico, 1911, (F. W. Urich), 2 ♀, [U. S. N. M.].

Teapa, Tabasco, Mexico, (H. H. Smith), 1 ♀, [A. N. S. P.].

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stouter form, slight differences in the costal veins of the wings[257] and differently shaped genital hook in the male.[258]

Type.—♂; Brownsville, Cameron County, Texas. July 31, 1912. (M. Hebard.) [Hebard Collection Type No. 410.]

Description of Type.—Size medium, form stout for the group. Head projecting slightly beyond pronotum, interocular space subequal to that between antennal sockets, ocellar areas very small and weakly defined, ocellar spots feebly indicated. Antennae covered with minute hairs, particularly in proximal half, which is slightly enlarged (but by no means plumose as in certain species of the genus). Maxillary palpi moderately stout; third joint elongate, fourth distinctly shorter and expanding evenly distad, fifth (distal) distinctly longer than third, enlarged, with oblique truncation reaching four-fifths of distance to base. Pronotum subcircular; evenly convex to lateral margins, which have a very briefly reflexed border (this visible only under a microscope); cephalic margin transverse, straight; cephalic and laterocaudal angles broadly rounded; lateral margins very weakly convex; caudal margin moderately produced and obtuse angulate mesad, with angle broadly rounded. Tegmina with numerous longitudinal discoidal sectors (normally seven or eight). Wings with proximal half of costal veins evenly and weakly thickened distad, buffy, with veins distinctly buffy, this whole area resultantly not transparent. Abdomen with second and third dorsal segments each supplied mesad with twin groups of long hairs directed caudad, many of these adhering at their distal extremities; fourth and fifth unmodified; sixth wholly concealed excepting lateral portions, which are very strongly produced distad with apices evenly rounded, extending as far caudad as mesal portion of caudal margin of seventh segment, concealed portion of sixth segment convex above concavity of seventh segment; seventh segment concave mesad, with a small median projection proximad, from which spring two small, adjacent, closely adhering, slender projections of hairs curving outward distad, the segment with a distinct medio-longitudinal sulcus from this point to the caudal margin, which is broadly and weakly emarginate mesad, laterad the segment is weakly produced with margin rounded; eighth segment transversely narrower, deplanate, caudal margin weakly concave, with a small nick opposite each cercal base. Supra-anal plate triangularly produced, with broad apex rounded. Cerci elongate tapering, with (normally eleven) distinct joints. Genital hook springs from a large, chitinous area situated meso-dextrad, not very elongate, chitinous, stout, curving weakly inward and tapering to acute apex. Subgenital plate smooth and convex exteriorly, with caudal margin roughly convex; intro-sinistrad on this margin is a stout, tapering, corneous style, with ventral surface heavily

[257] In *intercepta*, the vicinity of the swollen portions of the costal veins of the wings does not appear to be normally as much suffused with buffy and in consequence is less opaque.

[258] In these species the male abdominal and genitalic characters agree fully, except that in *intercepta* the genital hook is decidedly longer and more slender, with distal extremity very slightly enlarged.

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toothed; intro-dextrad on this margin is a larger, roughly anvil-shaped, corneous style, with inner margin bearing stout teeth and pointed extremity projecting proximo-laterad, elongate, acicular. Between these styles and the cercal bases, along the inner surface of the subgenital plate near its margin, are scattered minute, chitinous teeth.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very similar to male, differing in the following features. Head very slightly broader. Pronotum slightly more ample. Dorsal surface of abdomen unmodified. Supra-anal plate very broadly shield-shaped. Subgenital plate large, scoop-shaped, with caudal margin roughly convex.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Dallas, Texas		10.3	3.7	3.9	11.8	3.2
Waco, Texas		10.5	3.7	4	11.4	3.1
Zavalla County, Texas		11.8	3.8	4.2	11.4	3.3
Brownsville, Texas, *type*		10.2	3.7	4	11	3.2
Brownsville, Texas, *paratypes*	(6)	10–11.4	3.5–3.8	3.9–4	10.8–11.3	3.1–3.3
♀						
Dallas, Texas	(2)	11–11.8	3.8–4.2	4.3–4.7	10.9–11.9	3.4–3.6
Waco, Texas	(2)	9.5–10.5	3.8–3.9	4.2–4.7	11.6–11.7	3.3–3.4
Columbus, Texas	(2)	11.2–11.5	3.8–3.9	4.2–4.4	11.9–12.2	3.4–3.7
Zavalla County, Texas.		15	4.8	5.3	13.7	3.9
Brownsville, Texas, *allotype*		10	3.9	4.6	11.1	3.2
Brownsville, Texas, *paratypes*	(23)	9.8–11.9	3.8–4.3	4.2–4.7	11–12.1	3.2–3.4
Saltillo, Coahuila, Mexico		9	3.7	4	9	3
San José, Tamaulipas, Mexico		11.9	3.8	4.4	13	3.6

The above measurements indicate little geographic size variation in the United States; the specimen from Saltillo, Mexico, is, however, distinctly depauperate.

Coloration.—General color glossy, individually russet to brownish black. Head tawny, occasionally darker below the occiput. Antennae dark in proximal half, with eight to twelve mesal joints warm buff, distal portion of general coloration. Pronotum cinnamon-rufous, broadly margined with cream color, this narrowest cephalad. The mesal reddish brown portion is often immaculate,

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sometimes a darker suffusion occupies the caudal margin of this area, this darker suffusion is occasionally produced cephalad on the sides, or further developed and reuniting cephalad, thus sometimes leaving but a small mesal spot of reddish brown; in specimens of the maximum intensive coloration, all but the warm buff pronotal margins is suffused, shining blackish brown. Tegmina of general coloration, moderately broadly bordered on the costal margin with cream color. Costal area of wing suffused with general coloration, mesal portion of this area warm buff, this extending, to varying degrees, toward the wing margin; other portions of wing transparent, moderately iridescent, with veins of general coloration and distal portion of wing weakly suffused with the same. Limbs and ventral surface of body tawny, individually varying to dark mars brown; ventral abdominal segments usually very narrowly margined laterad with cream color.

Though sometimes found in litter on the ground, this species is more often encountered in the foliage of heavy weeds and about flowers.

Specimens Examined: 56; 14 males and 42 females.

Dallas, Texas, VI, 8 to VIII, 1, (J. Boll), 1 ♂, 3 ♀,[259] [M. C. Z. and Hebard Cln.].

Waco, Tex., V, 12 to VIII, 8, (Belfrage; a very rare species found at night), 1 ♂, 2 ♀, [M. C. Z.].

Blanco County, Tex., 1 ♀, [A. N. S. P.].

Columbus, Tex., VI, 22, 1 ♂, [U. S. N. M.]; VII, 30, 2 ♀, [Univ. Kansas and Hebard Cln.].

Zavalla County, Tex., IV, 27, 1910, (Hunter and Pratt), 1 ♂, 1 ♀, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 1 ♀, [Hebard Cln.].

Del Rio, Tex., VI, 22 to 27, (H. Wickham), 1 ♀, [Hebard Cln.].

Mercedes, Tex., II, 1909, (T. D. Usbahns), 1 ♂, [U. S. N. M.].

Santa Maria, Tex., V, 29, 1895, 1 ♀, [U. S. N. M.].

Brownsville, Tex., 1 ♀; (C. H. T. Townsend), 1 ♀; IV, 30 to VI, 5, 1904, (H. S. Barber), 2 ♂, 2 ♀; V, 23, 1913, (in dead brush pile), 1 ♀; VI, (F. H. Snow; Wickham), 2 ♂, 11 ♀;[260] VIII, 31, 1912, (Hebard; not scarce in heavy weeds, sunflowers, etc., in openings of river plain jungle scrub), 4 ♂, 6 ♀, entire Brownsville series *type, allotype, paratypes*, [Hebard Cln., Univ. Kansas, A. N. S. P., U. S. N. M. and Davis Cln.].

[259] It is upon these specimens and those from Waco, that Scudder based his "Texas" record of *cincta*.

[260] Upon a specimen of this series Rehn's record of *oblongata* was based, later referred by Caudell to *intercepta*.

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Piper Plantation, near Brownsville, Tex., VIII, 3, 1912, (Rehn and Hebard), 1 ♀, *paratype*, [Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., V, 1904, (C. Schaeffer), 1 ♂, 2 ♀, *paratypes*, [Bklyn. Inst.].

Topo stage station, near Brownsville, Tex., IV, 1904, (C. Schaeffer), 1 ♀,[261] *paratype*, [Bklyn. Inst.].

San Tomas, near Brownsville, Tex., IV, 26, 1904, (C. Schaeffer), 1 ♀, *paratype*, [Bklyn. Inst.].

Rocha Ranch, near Brownsville, Tex., IV, 1904, (C. Schaeffer), 1 ♀, *paratype*, [Bklyn. Inst.].

Saltillo, Coahuila, Mexico, 1 ♀, [Hebard Cln.].

San José, Tamaulipas, Mex., IV, 1910, (Bueno), 1 ♀, [U. S. N. M.].

Subfamily EPILAMPRINAE

The following features are considered diagnostic.—Antennae setaceous, never plumose. Tegmina normally coriaceous or corneous, fully developed or reduced. Wings with costal veins irregular, ulnar vein with incomplete rami. Supra-anal plate weakly to strongly bilobate in both sexes. Subgenital plate of male frequently slightly asymmetrical, rounded, with slender styles set in sockets, the dextral socket being the longer.[262] Femora with ventral margins weakly to heavily armed.

The members of this subfamily are all confined to the tropics. A single species has become established in the Florida Keys.

LEUROLESTES Rehn and Hebard

Blatta, *Nauphoeta*, *Phoetalia* and *Phaetalia* of authors.[263]

1914. *Wattenwyliella* Rehn and Hebard, Ent. News, xxv, p. 217. (May.) [Not of Carl, April, 1914.]

1914. *Leurolestes* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 379. (June.) (New name given for preoccupied *Wattenwyliella*.[264])

The genus contains two circumtropical species.

GENOTYPE: *Leurolestes pallidus* [*N[auphoeta] pallida*] (Brunner),

[261] Caudell's record of *cincta* is based on this specimen, or one taken with it.

[262] A somewhat similar general type of male subgenital plate is found in many species of the Epilamprinae and Blaberinae.

[263] In the case of *Phoetalia*, *laevigata* of Beauvois was unfortunately designated as genotype, and, in consequence, although the description is of the present genus, that name falls in the synonymy under *Nyctibora*. *Phaetalia* was caused by Shelford's error in spelling.

[264] Preoccupied by *Wattenwyliella* Carl, April, 1914.

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selected by Rehn and Hebard, at time their *Wattenwyliella* was proposed.

Generic Characters.[265]—Size medium small for subfamily, form depressed. Pronotum not covering vertex of head; caudal margin feebly convex, truncate. Tegmina and wings fully developed in both sexes, falling slightly short of, or reaching slightly beyond, the abdominal apex. Tegmina broadest meso-distad; scapular field not broad, narrowing decidedly distad; discoidal sectors (the majority of which are formed by branches of the ulnar vein) numerous and feebly radiating, with numerous transverse veinlets. Wings with mediastine vein reaching to near apex and bounding area of costal veins, which is very narrow; costal veins few and irregular; discoidal and median veins connected by numerous transverse veinlets, the former branching irregularly distad; ulnar vein with numerous (about eleven), strongly divergent, incomplete rami and few (about three) complete distal rami; axillary vein with few (two) branches. Supra-anal plate weakly bilobate in both sexes, cerci short. Male subgenital plate showing features comparable to those found in *Blaberus*. Cephalic femora with ventro-cephalic margins armed proximad with a few, short, heavy spines, followed by a row of minute, closely set, piliform spinulae, terminating distad in a single, moderately elongate, heavy spine; other femoral margins supplied with few, scattered, short, moderately stout spines; genicular spines of median and caudal femora only slightly longer than these. Tarsi with first joint bearing disto-ventrad a large pulvillus, succeeding three joints with brief ventral surfaces each fully occupied by a large pulvillus. Caudal metatarsus as long as remaining tarsal joints. Arolium ample, but not extending more than half the distance to apex of the heavy tarsal claws, its distal margin rather strongly angulato-emarginate, with apex rounded.

Leurolestes pallidus (Brunner) (Plate VI, figures 9 and 10.)

1839. *Blatta laevigata* Serville (not of Beauvois, 1805), Hist. Nat. Ins., Orth., p. 98. [Cuba; Martinique.]

[265] Until a general study of the subfamily is made, we do not feel satisfied that some of the features here given, should not be placed instead in the diagnosis of the Epilamprinae.

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1865. *Nauphoeta pallida* Brunner, Nouv. Syst. Blatt., p. 286. [Cuba.]
1868. *Nauphoeta marginalis* Walker, Cat. Blatt. Br. Mus., p. 41. [—?]
1904. *Phoetalia pallida* Kirby, Synon. Cat. Orth., i, p. 116. [West Indies; Brazil; Teneriffe, Canary Islands.]
1910. *Phoetalia laevigata* Rehn and Hebard (not *Blatta laevigata* of Beauvois, 1805), Ent. News, xxi, p. 103. [Key Largo, Florida.]
1910. *Phaetalia laevigata* Shelford (not *Blatta laevigata* of Beauvois, 1805), Gen. Ins., Fasc. 101, Blattidae, Epilamprinae, p. 8.
1914. *Wattenwyliella pallida* Rehn and Hebard, Ent. News, xxv, p. 216. (May.)
1914. *Leurolestes pallidus* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 379. (June.)

The references and synonymy for the present species are given by Rehn and Hebard in May, 1914, to that date. The generic name there proposed was preoccupied by *Wattenwyliella* Carl, described in April, 1914. The species has, in past literature, been much confused with the extremely different *Nyctibora laevigata* (Beauvois).

Of the North American roaches, this species shows some slight superficial resemblance to *Pycnoscelus surinamensis;* the different form of the pale pronotal borders and numerous generic features of difference, readily distinguish these widely separated forms.

Characters of Male.—(Key West, Florida.) Size rather small for the subfamily. Head with interocular space about two-thirds as wide as the interocellar space; ocelli large and distinct; flattened surfaces of ocellar areas weakly oblique, but with inner margins not raised above plane of flattened face. Maxillary palpi short, fourth joint distinctly shorter than third or fifth and decidedly constricted proximad. Pronotum weakly convex, except laterad where it is strongly declivent; cephalic margin very weakly convex, transverse, rounding broadly into lateral margins, which are weakly convex and strongly divergent caudad, rounding broadly into the caudal margin, which is weakly convex, transverse. Tegmina and wings (normally) slightly exceeding apex of abdomen (venation, pl. VI, fig. 9). Supra-anal plate delicate, produced but transverse, very weakly bilobate. Cerci very short, compact, with (ten) distinct joints, these very brief, tapering to acute apex. Sinistral portion of anal chamber empty, mesad a soft, sub-cylindrical mantle projects distad, with truncate distal margin supplied with a closely set fringe of microscopic chitinous teeth. Dextral portion of anal chamber occupied by a large, convolute chitinous plate. Subgenital plate convex, asymmetrical; free margin very broadly convex from sinistral base to mesal portion of dextral half, there rounding sharply into rather deeply concave emargination at dextral base, within which the margin is subchitinous. Minute, slender, cylindrical styles are situated on this margin at

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the inner margins of the cerci, the sinistral very long, the dextral distinctly longer and over half as long as the cercus.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Size distinctly larger. Head with interocular space nearly equal in width to that of interocellar space. Tegmina and wings (normally) falling slightly short of the apex of the abdomen. Supra-anal plate rather delicate, produced but transverse, rather broadly convex but feebly emarginate mesad, thus weakly showing bilobation. Subgenital plate very ample; distal margin in general convex, but broadly flattened at point where cerci project and also mesad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida...	(18)	15.2–17.3	3.3–3.9	4.9–5.7	12.4–13.6	4.2–4.5
♀						
Key West, Florida...	(26)	18.5–20	4.1–4.3	6.1–6.4	14.8–15.2	4.7–5

Coloration.—Pronotum maroon, individually suffused with blackish to varying degrees; bordered laterad and cephalad with warm buff, two rotundato-angulate lateral invasions of this color extending into the disk on each side and one meso-cephalad. Tegmina translucent dresden brown, prout's brown proximad at humeral trunk, marginal field warm buff. Head marked between the eyes dorsad with warm buff, sometimes there spreading into a band. Abdomen dark, narrowly but conspicuously bordered, individually to varying degrees, with warm buff.

Immature examples of the species are everywhere shagreenous above, and uniform, suffused liver brown in coloration. As in other species of the Blattidae, the insect after moulting, while still very soft, is whitish buff.

The species is known in the United States only from the material recorded below. This is a tropical domiciliary insect and was found at Key West in a pile of old burlap bags, and in cracks under the stands of a fruit store, in company with *Supella supellectilium*, *Blattella germanica*, *Periplaneta americana* and *Holocompsa nitidula*.

Specimens Examined: 53; 18 males, 27 females and 8 immature individuals.

Key Largo, Florida, III, 1898, (C. L. Pollard), 1 ♀, [U. S. N. M.].

Key West, Fla., VIII, 3 to 7, 1912, (Rehn and Hebard), 18 ♂, 26 ♀, 3 juv. ♂, 3 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

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Subfamily BLATTINAE

The following features are considered diagnostic. Head with vertex usually exposed. Ocellar spots rarely absent. Tegmina, when present, usually semicoriaceous. Male subgenital plate rotundato-rectangulate and symmetrical, with a pair of slender styles, of equal length, set in similar sockets on the distal margin. Male concealed genitalia very complex. Subgenital plate of female with meso-distal portion valvular; a transverse, weakly arcuate suture bounding these valves proximad. Femora with ventral margins heavily spined.

The valvular female subgenital plate, with basal suture of valves transverse arcuate, is a distinctive feature, found only in the Blattinae and occurring in all of the species of this subfamily. Shelford,[266] following Brunner, however, was not fully correct in his comments on this character, as a valvular female subgenital plate, though different in structure, is characteristic of the genera *Anaplecta*, *Holocompsa*, *Compsodes* and *Homoeogamia*, members of the Ectobiinae, Corydiinae and Polyphaginae.

We do not, however, conform with Caudell[267] in merging the Psuedomopinae and Blattinae[268] on the ground that they appear to differ in this feature alone. The present subfamily is in our opinion, fully as satisfactory as the others in the Blattidae. In no case can these subfamilies be separated by one or two absolutely diagnostic characters, and we are forced to rely rather upon a general appearance of consanguinity added to a certain usual combination of characters. We can not too strongly emphasize the assertion that subfamilies are artificial groupings to facilitate systematic work, and, as they are such, exceptions must be expected. In fact the laws of organic evolution prohibit the development, within a family like the Blattidae, of subdivisions, such as we term subfamilies, with distinctions clear cut and constant. The species of the Blattidae are too numerous, and far too many primitive types still survive, for this to be possible.

[266] Gen. Ins., Fasc. 109, Orth., Blattidae, Blattinae, p. 1, (1910).

[267] Proc. U. S. Nat. Mus., xliv, p. 600, (1913).

[268] That author states "I have united Periplanetinae with Blattinae." Instead of Periplanetinae, Pseudomopinae was intended, the equivalent of which has been Phyllodromiinae.

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EURYCOTIS Stål

1874. *Eurycotis* Stål, Bih. K. Svensk. Vet. Akad. Handl., ii, no. 13, p. 13.

The genus includes numerous West Indian and tropical American species, but one being found in, and peculiar to, the United States.

The present genus is separated from *Pelmatosilpha* by the more reduced organs of flight. Though this feature is valueless, even for specific separation, in many of the forms of the Pseudomopinae, it apparently constitutes a valid diagnostic character in the present instance and is, indeed, usually far more important throughout the Blattinae. Monographic studies, however, must be undertaken before definite conclusions can be reached.

The genus *Eurycotis* divides into several distinctive groups.[269]

GENOTYPE, by original designation: *Eurycotis rufovittata* [*Polyz[osteria] rufovittata*] (Brunner) = *Eurycotis mysteca* [*P[eriplaneta] mysteca*] (Saussure).

Generic Characters.—Sexes similar. Width between eyes greater than that between antennal sockets. Pronotum convex, roundly trapezoidal, not covering vertex of head. Tegmina squamiform or quadrate, not extending beyond metanotum and truncate distad. Wings absent, squamiform or greatly reduced. Ventro-cephalic margins of cephalic femora supplied with stout, not very elongate, moderately recurved spines, decreasing slightly in length distad and terminating in three spines, more elongate in increasing ratio distad; ventro-caudal margins supplied with few, stout, elongate spines. Other ventral femoral margins supplied with numerous, stout, elongate spines; those of the caudal margins distinctly the longer. External tibial spines tri-seriately arranged. Tarsal joints heavy; metatarsi supplied ventrad with an elongate distal pulvillus, succeding three joints each with ventral surface occupied by a large pulvillus. Arolia ample, with dorsal surfaces chitinous, distal margins feebly convex, truncate.

[269] Kirby, misunderstanding the degree of tegminal reduction used to separate *Eurycotis* from *Pelmatosilpha*, incorrectly transfers *opaca* (Brunner) and *floridana* (Walker) to the latter genus. Syst. Cat. Orth., i, p. 143, (1904).

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Eurycotis floridana (Walker) (Plate VI, figures 11 to 14.)

1868. *Periplaneta floridana* Walker, Cat. Blatt. Br. Mus., p. 135. [♀: St. John's Bluff, east Florida; North America.] (Pronotum with pale lateral margins, adult.)

1868. *Periplaneta semipicta* Walker, ibid., p. 141. [♂; St. John's Bluff, east Florida.] (With pale lateral bands, immature.)

1877. *Platyzosteria ingens* Scudder, Proc. Bost. Soc. Nat. Hist., xix, p. 92. [3 ♂, 1 ♀; Fort Reed, Florida.] (Unicolorous blackish red-brown adults.)

1877. *Platyzosteria sabalianus* Scudder, ibid., p. 93. [2 ♂; Sanford, Florida.] (With pale lateral bands, immature.)

The above synonymy has already been fully established. Misconception of the value of presence or absence of pale lateral markings in the present species, and error in supposing immature examples to be adult, caused most of the confusion. Scudder, however, was even more at fault, as Walker's names were evidently ignored, while his comparisions at Vienna with Brunner's "types of *opaca*" show an additional error.[270]

The present species belongs to the second portion of the genus, which includes the large and heavy species. In linear position, it follows the distinctive *E. tibialis* and is succeded by *E. opaca*, to which species it is very closely related.

The differences from *opaca*[271] may be summed up as follows. Size averaging smaller, form less robust and surface less roughened. Coloration not as nearly solid black.[272]

This insect shows quite decided size variation, irrespective of geographic influences. In the instars preceding maturity, from about half grown to the last, the pronotum, mesonotum and metanotum are often conspicuously marked laterad with broad pale yellowish bands; these are rarely weakly indicated, never pronounced,

[270] The species was described from a single specimen in the Dohrn Collection at Stettin.

[271] 1865. *P[olyzosteria] opaca* Brunner, Nouv. Syst. Blatt, p. 216. [♂, Cuba.]

The comparisons here made are based upon the following material, besides the two adventive females recorded on page 267.

San Diego de los Baños, Pinar del Rio, Cuba, IV, 22, 1900, (Palmer and Riley), 1 juv. ♀, [U. S. N. M.]. (Incorrectly recorded as *E. floridana* by Rehn, in 1909.)

Sancti Spiritus, Santa Clara, Cuba, IV, 1904, (H. A. Pilsbry), 1 ♀, [A. N. S. P.].

Varadero, north coast of Cuba, (J. W. Ross), 1 ♂, [A. N. S. P.].

[272] Additional Cuban material will probably make clear other diagnostic features. The material before us, though showing in every case a distinctly different facies from that developed in *floridana*, is not sufficient to determine whether or not certain features of possible difference are ascribable to individual variation.

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in the adult condition over this region. In this material the general coloration is rich blackish red-brown.

Characters of Male.—(Miami, Florida.) Head large, eyes widely separated, vertex rounding evenly into face, which is weakly convex, vertex with three weakly defined, perpendicular sutures, these often obsolete, pale ocellar spots usually suffused, a larger pale spot usually present below the antennal sockets on the genae. Maxillary palpi small; fourth joint distinctly shorter than third, fifth (distal) joint distinctly shorter than fourth. Dorsal surface polished; pronotum and metanotum microscopically punctulate, tegmina cribroso-punctulate, abdomen weakly punctulate becoming shagreenous distad. Pronotum not strongly convex, this convexity slightly the greatest medio-longitudinally; cephalic margin very weakly convex, with surface there also weakly convex ventrad, rounding evenly into lateral margins, which are moderately convex and divergent to caudal angles, which are moderately sharply rounded, the lateral and caudal margins there forming an angle appreciably less than a right-angle; caudal margin very weakly convex, nearly straight. Tegmina subquadrate, extending just beyond caudal margin of mesonotum; the sutural margins slightly overlapping, or separated by a space of over 2 mm.; costal and sutural margins very weakly convex and subparallel, the former cingulate; distal margin transverse, truncate, occasionally briefly, weakly and roundly produced at the external angles. Wings absent. Latero-caudal angles of fourth to sixth dorsal abdominal segments produced, in increasing ratio caudad, in slender, sharp, elongate teeth. Supra-anal plate decidedly transverse; lateral margins weakly converging distad, distal margin broadly obtuse-angulate emarginate and decidedly hairy, margin of plate, at rather sharply rounded latero-caudal angles, supplied with microscopic, stout, sharp spines; ventral surface of plate thickly studded with such spines. Cerci rather short, with (about ten) weakly defined joints, tapering distad to acute apex; dorsal surface deplanate, ventral surface convex, with lateral margins very narrowly and weakly flattened. Genital hook situated sinistro-ventrad in anal chamber, an elongate, slender, flattened, chitinous process which projects caudad, proximad it is horizontally flattened, distad obliquely flattened, there directed dextrad, narrowing and curving toward the apex which is enlarged, flattened, with distal portion feebly produced, convex in outline except ventral margin which is straight, the apex at this margin narrowly produced in a sharp projection. The anal chamber is filled proximad with a complexity of lobiform processes, in large part chitinous, from which project mesad two short, sharp, chitinous spikes and a single subchitinous, slightly longer process curved dorsad; dextrad of these an elongate, slender, chitinous process, as long as the genital hook, tapers and curves gently dextrad to its aciculate apex. Subgenital plate transverse, strongly emarginate meso-laterad, at which points on the margin, in soft sockets, are situated symmetrical, rather stout, very elongate styles, which taper evenly to their acute apices, mesal half of plate produced with margin broadly convex. Limbs and armament of same as given in generic description.

Characters of Female.—(Miami, Florida.) Agrees with male in ambisexual characters, differing in the following features. Supra-anal plate more produced; lateral

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margins converging to mesal portion, which is roundly emarginate and not nearly as broad as in male. Subgenital plate of the normal valvular Blattinid type;[273] with angles of lateral margins, at transverse basal suture of valves, briefly acute-angulate produced.

Measurements (in millimeters) of extremes

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia	Length of caudal tarsal joints
Miami, Florida...	31	9.6	13.2	6.7	7.7	11	7.7
Miami, Florida...	35	10.4	15.2	7.3	8.7	12.4	8.6
♀							
Billy's Island, Georgia.....	35	11	15.3	7.8	8.9	12.5	8
Miami, Florida...	30	9.3	13.9	7.7	8.2	11	7.8
Key West, Florida	31.5	10.1	14.2	7.3	8.5	11.9	7.7
Key West, Florida	39.5	11.8	16.4	8.2	9.3	14.3	9.2

In the entire series before us, the length of the caudal tarsal joints is contained in the caudal tibia from 1.41 to 1.65 times.

Coloration.—General coloration blackish, tinged with claret brown (intensive), varying to blackish claret brown, this paler on pronotum, mesonotum and metanotum (recessive). The pronotum is usually immaculate, but sometimes shows traces of lateral paler bands; occasional specimens have a small area there of buffy, tinged with claret brown, while rare specimens have broad lateral bands of ochraceous-orange, tinged laterad with morocco red, this banding again indicated, but not as heavily, in the marginal field of the tegmina and laterad on the metanotum. In specimens of recessive coloration, the head is morocco red, the ocellar areas, face below the antennal sockets and clypeus, ochraceous-buff. The exposed ventral portions of pronotum, mesonotum and metanotum, ventral surface of thoracic segments and coxae, ochraceous-buff, the coxae lined proximad with deep claret brown. The femora morocco red, the tibiae and tarsi deep claret brown, the pulvilli buffy. The ventral surface of abdomen, of general coloration. In the maximum intensive condition, the clypeus and small areas on the ventral surface of the pronotum, mesonotum and metanotum and on the coxae, alone are buffy.

[273] These valves are not completely separated. An expansive integument joins their inner margins; upon this the ootheca rests when partly extruded, the valves gripping its sides.

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In the immature condition, to the last instars preceding maturity, the pronotum, mesonotum and metanotum are very often strikingly and broadly margined laterad with buffy. Immature examples as immaculate as the normal adult are rare, except in the earliest instars. Every degree of variation, from the uniform, to the banded type, is represented in the series before us.

The known distribution of the present species is defined by the records given below. These roaches are found in almost every out-door sheltered position, under bark of dead trees, in stumps, under signs and in cavities in the limestone rock of southern Florida and the Florida Keys. Adults only, of both sexes, when alarmed are able to emit a greasy liquid of a most repellent odor, this odor strongly suggesting that of the Hemipteron, *Brochymena annulata* (Fabricius).

Specimens Examined: 86; 18 males, 23 females and 45 immature individuals.

St. Simon's Island, Georgia, VIII, 30, 1911, (Rehn and Hebard; in cavity of live oak, *Quercus virginiana*), 1 ♂, 1 ♀, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Billy's Island, Okeefenokee Swamp, Ga., IX, 1 to 5, 1913, (J. C. Bradley), 1 ♀, [Hebard Cln.].

Jacksonville, Florida, (W. T. Davis; in log), 1 juv. ♀, [Hebard Cln.].

Ortega, Fla., IX, 6, 1913, (W. T. Davis), 1 juv. ♂, [Hebard Cln.].

Green Cove Springs, Fla., (Boardman), 1 ♀, [M. C. Z.].

Levy County, Fla., III, (P. Laurent), 1 ♂, 1 juv. ♂, [Hebard Cln.].

Cedar Keys, Fla., VIII, 15, 1905, (Rehn and Hebard; under bark of pine log), 2 ♀, [A. N. S. P. and Hebard Cln.].

Tampa, Fla., I, 16, 1904, (Hebard; under bark), 1 ♂, 2 ♀, 3 juv. ♂, 2 juv. ♀, [Hebard Cln. and A. N. S. P.].

Lakeland, Fla., XI, 8, 1911, (W. T. Davis), 1 juv. ♀, [Hebard Cln.].

Inverness, Fla., 1892, (C. M. Weed), 1 juv. ♂, [Hebard Cln.].

Punta Gorda, Fla., XI, 11, 1911, (W. T. Davis; climbing about on top of goldenrod at night), 1 ♂, [A. N. S. P.].

Useppa Island, Charlotte Harbor, Fla., V, 17 to 19, 1915, (Hebard; on ground, in heavy tangle, after dark), 1 ♀, [Hebard Cln.].

Everglade, Fla., IV, 9, 1912, (W. T. Davis), 1 ♂. [Hebard Cln.].

Sanford, Fla., IV, 6, 1875, (top of cabbage palmetto), 1 juv. ♂, *type* of *Platyzosteria sabalianus* Scudder, [M. C. Z.].

Fort Lauderdale, Fla., III, 1, 1916, (Hebard; juv. occasional under signs on *Pinus caraibea*), 1 juv. ♀, [Hebard Cln.].

Ojus, Fla., II, 29, 1916, (Hebard; few adults, juv. occasional under signs on *Pinus caraibea*), 1 ♂, [Hebard Cln.].

Miami, Fla., II, 28, 1916, (Hebard; few adults, juv. occasional under signs on *Pinus caraibea*), 1 ♂, 1 juv. ♀, 1 small juv.; III, 4, 1916, (Hebard; Musa Isle,

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in decaying log of *Sabal palmetto*), 1 ♂; III, 4 to 16, 1915, (Hebard; Brickell's Hammock, trapped, molasses jar, numerous), 1 ♂, 2 ♀, 1 juv. ♂, 2 small juv.; VI, 28, 1899, (H. A. Pilsbry), 1 ♀, [all Hebard Cln. and A. N. S. P.].

Snapper Creek Hammock, Dade County, Fla., II, 29, 1916, (Hebard; few juv. in epiphytic bromeliads, *Tillandsia fasciculata*, on *Quercus virginiana*, on edge of hammock), 1 juv. ♂, [Hebard Cln.].

Homestead, Fla., III, 28, 1910, (Hebard; under bark of pine logs), 1 juv. ♂, 2 small juv.; VII, 10 to 12, 1912, (Rehn and Hebard; one, at night, on pine trunk), 1 ♂, 1 ♀, 1 small juv., [Hebard Cln. and A. N. S. P.].

Detroit, Fla., VII, 12, 1912, (Rehn and Hebard; in epiphyte, *Tillandsia fasciculata*, on *Quercus virginiana*), 1 juv. ♂, [Hebard Cln.].

Royal Palm Key, Fla., III, 3, 1917, (Hebard; common under bark and debris in jungle), 1 ♂, 1 ♀, 1 juv., [Hebard Cln.].

Long Key, Fla., III, 13, 1910, (Hebard; under the dry fibers at the base of the heads of cocoanut palms), 4 juv. ♂, 2 juv. ♀, 3 small juv., [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 18 and 19, 1904, (Hebard; very numerous under limestone boulders in keys scrub), 1 ♂, 2 ♀; III, 15 and 16, 1910, (Hebard; under boards and limestone boulders), 1 ♂, 7 ♀, 1 juv. ♂, 1 juv. ♀, 7 small juv.; VII, 3 to 7, 1912, (Rehn and Hebard; one, at night, climbing in weeds), 2 juv. ♂, [Hebard Cln. and A. N. S. P.].

Warrington, Fla., VIII, 4, 1903, (A. P. Morse), 4 ♂, 1 ♀, [Morse Cln.].

Biloxi, Mississippi, III, 15, (F. M. Jones), 1 ♂, [A. N. S. P.].

NEOSTYLOPYGA Shelford

1911. *Neostylopyga* Shelford, Ent. Rec., xxiii, p. 242.

The numerous species of the present genus are tropical in distribution, the majority being found in Africa and the far East.

GENOTYPE, by original designation: *Neostylopyga rhombifolia* [[*Blatta*] *rhombifolia*] (Stoll).

Generic Characters.—Sexes similar. Tegmina reduced to lateral, squamiform lobes; wings absent. Fifth[274] dorsal abdominal segment unmodified, not enlarged or declivent.[275] External tibial spines tri-seriately arranged. Tarsi with small distal pulvilli, the pulvillus of the fourth (smallest) joint not entirely occupying its ventral surface. Caudal metatarsus longer than the succeeding joints. Arolia moderately large, truncate distad.

[274] Shelford, in the Genera Insectorum, has given "sixth" dorsal abdominal segment, due to the fact that he counted the median segment as the first.

[275] An enlarged and declivent type of this segment is characteristic of females of the Old World genus *Pseudoderopeltis*.

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Neostylopyga rhombifolia (Stoll) (Plate VI, figure 15.)

1813. [*Blatta*] *rhombifolia* Stoll, Natuur. Afbeeld. Beschr. Spoken etc., Kakkerlakken, p. 5, register p. 14, pl. IIId, fig. 13. [Apparently an immature female; no locality given.]

Stoll's figure shows plainly the distinctive color pattern of the species. The established synonyms are *Periplaneta histrio* Saussure, *Periplaneta decorata* Brunner and *Polyzosteria heterospila* Walker.

This is a large roach, shining brownish black in general coloration, beautifully marbled with yellowish-buff (pl. VI, fig. 15). The color pattern and brief lateral tegminal pads readily distinguish the insect from any other species found in the regions under consideration.

Characters of Male.—(Moschi, Kilimanjaro, East Africa.[276]) Size moderately large, form stout. Head much as in *Periplaneta americana*, but with ocellar areas forming a slightly less obtuse angulation with the interocellar area, ocellar spots very weakly indicated. Pronotum weakly convex, yet showing extensive but weak lateral and meso-caudal flattening; margin above head straight, transverse, thence convex divergent to latero-caudal angles, which are rectangulate and sharply rounded; caudal margins of pronotum, mesonotum and metanotum, straight, transverse. Tegmina small, lateral pads, extending to slightly beyond caudal margin of mesonotum; surface shining, minutely punctulate, with humeral trunk alone distinct; costal and sutural margins subparallel, each showing a faint convexity, distal margin rounded with apex nearer the costal margin. Wings absent. Dorsal surface of abdomen unspecialized, latero-caudal angles of segments briefly acute-angulate produced caudad, the degree of production slightly increasing caudad. Supra-anal plate chitinous only in very narrow proximal portion, remaining produced portion formed by a delicate whitish integument with free margin convex except mesad, where a deep acute-angulate emargination, with straight, convergent sides, extends fully half the distance to the base of the delicate portion.[277] Subgenital plate small, free margin briefly convex, transverse to base of styles, between these broadly convexo-truncate. Styles symmetrical, very elongate, slender, cylindrical processes, slightly longer than length of subgenital plate, set in sockets on free margin of the plate at lateral bases of the slightly produced mesal portion. Limbs elongate and slender. Cephalic femora with ventro-cephalic margins armed with a row of heavy and moderately elongate spines, terminating distad in three

[276] The exotic series before us, of some forty specimens, shows a very decided preponderance of females. Though several immature males are included, this is the only adult of the sex available.

[277] The texture and form of this delicate integument shows a general similarity to that found in males of *Periplaneta americana*, though in that species both production and emargination are much more decided.

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longer spines, in strongly increasing length ratio, few spines on ventro-caudal margin; median and caudal femora furnished with a single, long, genicular spine and with ventral margins supplied with heavy, elongate spines. Arolia present.

Characters of Female.—(Nogales, Arizona.) Agrees with male except in following features. Size large, form stouter. Head and pronotum in consequence proportionately broader. Supra-anal plate strongly tectate, with a medio-longitudinal ridge; lateral margins straight, convergent to deep median angulate-emargination, with straight sides, distal apices of plate acute. Subgenital plate as typical for the Blattinae.

Measurements in (millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Moschi, Kilimanjaro, East Africa	20.4	6.4	9	3.8	3.3	8.7
♀						
Nogales, Arizona	25.3	7	9.6	4.2	3.4	9.2

Other exotic females before us are 20 to 27 mm. in length.

The complex color pattern is shown by the figure here given. The dark brownish black color is tinged with claret brown on the tegmina, mesal portion of dorsal surface of abdomen and on the limbs. The extensive dark mesal portion of the ventral surface of the abdomen is a rich claret brown.

This insect is generally distributed throughout the warmer regions of the earth; it is probably domiciliary, with habits very similar to those of *Periplaneta americana*.

In the United States the species has apparently gained a foothold only at Nogales, Arizona, on the Mexican boundary. It has probably been long established in western Mexico and has been recorded from there by Saussure, from Acapulco by Brunner, while a good series from tropical western North America is now before us.[278]

Specimens Examined: 1; 1 female.

Nogales, Arizona, VI, 14, 1903, (E. J. Oslar), 1 ♀, [U. S. N. M.].

[278] Sierra el Tosti, Lower California, Mexico, X, 1893, 2 ♀, [Hebard Cln.].

San José del Cabo, L. Cal., Mex., 8 ♀, 1 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. M. N. H.].

Escuinapa, Sinaloa, Mex., (J. H. Batty), 1 small juv. ♂, [A. M. N. H.].

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BLATTA Linnaeus

1758. *Blatta* Linnaeus, Syst. Nat., Ed. X, i, p. 424.
1825. *Kakerlac* Latreille, Fam. Nat. Regne Anim., p. 411.
1833. *Steleopyga* Fischer, Bull. Soc. Nat. Moscou, vi, p. 356.
1846. *Stylopyga* Fischer, Ent. Ross., Orth., p. 68. (Emendation for *Steleopyga*.)

The genus includes numerous species, the majority of which are tropical in distribution.

GENOTYPE: *Blatta orientalis* Linnaeus, subsequently indicated by Latreille in 1807.[279]

Generic Characters.—Sexes dissimilar. Antennae elongate, setaceous. Pronotum roundly trapezoidal, not covering vertex of head. Tegmina and wings of male variable, not attaining the apex of the abdomen. Tegmina of female, in the majority of species, squamiform or quadrate[280]; wings absent, vestigial or greatly reduced.[281] Ventro-cephalic margins of cephalic femora supplied with few, stout, not very elongate, slightly recurved spines, decreasing slightly in length distad and followed by a series of slightly shorter spines, terminating in three elongate spines in increasing length ratio distad. Other femoral margins supplied with numerous stout, elongate, straight spines; those on the caudal margins distinctly the longer. External tibial spines tri-seriately arranged. Tarsi elongate, caudal metatarsus longer than succeeding joints. First four tarsal joints each supplied with a small distal pulvillus. Arolia absent.

Blatta orientalis Linnaeus. (Plate VII, figures 1 and 2.)

1758. [*Blatta*] *orientalis* Linnaeus, Syst. Nat., Ed. X, i, p. 424. [America; the East; Russia; Stockholm, Sweden; Finland.]

The established synonyms of the species are *Blatta culinaris* De Geer, *Blatta ferrugineofusca* Gronov and *Blatta badia* Saussure.

[279] Gen. Crustac. et Ins., iii, p. 83.

[280] In one species before us, *agaboides* (Gerstaecker), the tegmina and wings vary from decidedly reduced, to fully developed, in both sexes. This is unusual in the Blattinae, the vast majority of species showing far less individual variation in the organs of flight than is shown by numerous species of the Pseudomopinae.

[281] In females of the species having the usual type of squamiform tegmina, the wings are absent.

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The internal structure of this insect has been extensively studied.[282]

This is a medium large, blackish brown insect, the males of which have the tegmina falling short of the apex of the abdomen, while in the females these organs are represented by small, ovate-lanceolate, lateral pads.

Characters of Male.—(Chestnut Hill, Pennsylvania.) Size medium large, form moderately stout. Head much as in *Periplaneta americana* (ocellar area forming a slightly less obtuse angulation with the interocellar area than in that species), broad; interocular space wide, slightly greater than the interantennal space; surface of ocellar area weakly concave, ocelli distinct; maxillary palpi moderately elongate. Pronotum nearly oval, but with greatest width meso-caudal; weakly convex, with disk weakly deplanate latero-caudad. Tegmina covering about two-thirds of abdomen, strongly overlapping. Wings reaching as far as tegminal apices. Supra-anal plate transverse, subrectangulate produced, lateral margins weakly concave to sharp, subrectangulate angle formed with distal margin, which is very weakly concave, the plate at this margin becoming subchitinous, particularly mesad. Cerci deplanate dorsad; lateral margins feebly crenate, converging distad to the acute apex. Within the anal chamber sinistrad, a flattened, chitinous shaft extends caudad, narrowing to its least width at base of distal portion; this portion bent dorsad, flattened, broad, tapering to the sharply rounded apex, with a small proximo-sinistral thorn, curving inward. The chamber is nearly filled with chitinous plates which converge mesad, from between which a paired, aciculate, chitinous projection is directed sinistrad, and a recurved, slender, chitinous spine is directed caudad.[283] Subgenital plate transverse, convex to distal margin, where it is narrowly concave; lateral margins brief, weakly convex produced to the distinct style sockets, distal margin between these broadly convex.[284] Styles set in sockets on the free margin at the latero-caudal angles, very slender, cylindrical processes of equal length and thickness, each as long as distance from socket to base of subgenital plate. Limbs and armament of same as given in generic description. No arolia present.

[282] A full bibliography of such work is given by Bordas in his "Recherches anatomiques histologiques et physiologiques sur les organes appendiculaires de l'appareil reproducteur femelle des Blattes (*Periplaneta orientalis* L.)." Ann. Sci. Nat., 9 serié, Zool., ix, p. 71 to 121, (1909).

[283] The other plates and projections being likewise movable, but more liable to assume different positions when drying, we find that, in dried material, their significant angles and projections are frequently concealed. Examination of living material would be necessary to determine their normal position, while, to determine their form in dried material, elaborate and destructive dissections would be imperative.

In the Blattinae these organs would undoubtedly be found most interesting in structure and of diagnostic value, their general character probably being of decided generic diagnostic value, but, in cases where species can be differentiated without this aid, the genital hook should best alone be considered.

[284] This convexity sometimes shows a feebly angulate condition.

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Characters of Female.—(Chestnut Hill, Pennsylvania.) Agrees with male except in the following features. Form decidedly stout. Head slightly broader, interocular space wider and distinctly greater than interantennal space, ocelli represented by small spots. Pronotum larger, evenly convex, with greatest width near caudal margin, which is straight transverse.[285] Tegmina small, ovate-lanceolate, lateral pads, reaching only slightly beyond mesal portion of metanotum. Wings absent. Supra-anal plate strongly tectate, with a medio-longitudinal ridge; subtriangular in outline, with lateral margins weakly convex and apex decidedly angulate-emarginate. Cerci slightly stouter, with lateral margins scarcely crenate. Subgenital plate valvular, as typical for the Blattinae (see pl. vii. fig. 9).

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Chestnut Hill, Pennsylvania.						
♂	(21)	20–24	5.7–6.3	7.1–7.9	11.9–16.7	5–6.7
♀	(23)	18–23	6.1–7.1	8.2–9.6	4.8–6.8	2.8–4.2

These extremes are not exceeded by any of the other specimens before us and are evidently due to individual variation.

Coloration.—♂. General color shining blackish chestnut brown, limbs chestnut to sanford's brown, ventral surface of abdomen becoming burnt sienna mesad. Ocelli buffy.

♀. General color shining blackish brown with a faint chestnut tinge, this more pronounced on the limbs. Ocellar spots buffy. Rarely paler females occur, approximating the normal general coloration of the males, while a few males before us are as dark as the normal females.

Ootheca large, carried with suture dorsad; lateral surfaces convex, microscopically shagreenous, with feeble depressions indicated toward the suture, which define the egg sacks within; ventral margin weakly convex, sutural margin weakly concave. Suture high, delicate, transparent, with linear, oblique divisions showing laterad; above showing a series of ridges, which form a succession of horseshoe-shaped links, these feebly ascending caudad, with caudal margins, in consequence, briefly perpendicular.

[285] Throughout the Blattidae reduction in the organs of flight is accompanied by a broadening of the pronotum, its point of greatest width moving caudad and the caudal margin becoming increasingly transverse. These features develop in absolutely proportionate ratio, and recognition of this fact is of great importance to the systematist.

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This cosmopolitan, domiciliary pest has been spread by commerce over all but the most northern portions of the United States. It has been recorded in Canada only from Toronto and Sarnia, Ontario. As is the case with *Blattella germanica*, its greatest abundance on this Continent appears to be reached in the central latitudes of the United States. In infested houses about Philadelphia it appears in swarms during the month of May, coincident with the arrival of the shad in the Delaware River, and in consequence is locally known as the Shad Roach.

Specimens Examined: 101; 48 males, 45 females and 8 immature individuals.

New Haven, Connecticut, 1 ♀, [A. N. S. P.].

Camden, New Jersey, VII, 17, 1904, (G. M. Greene), 1 ♀, [A. N. S. P.].

Philadelphia, Pennsylvania, V, 4 to VI, 20, 1896 and 1914, (majority E. R. Casey), 7 ♂, 8 ♀, 1 juv. ♂, 1 juv. ♀, [A. N. S. P.].

Chestnut Hill, Pa., V, 3 to 10, 1914, (Hebard; in kitchen), 21 ♂, 23 ♀, 1 juv. ♂, [Hebard Cln.].

Harrisburg, Pa., VI, 10 to VII, 6, (at light), 5 ♂, 25 ♀, [Pa. State Dept. Zool. Cln.]; X, 14, 1916, (E. Daecke), 1 ♀ with ootheca, [Daecke Cln.].

Erie, Pa., 1 ♂, 1 juv. ♀, [Pa. State Dept. Zool. Cln.].

Raleigh, North Carolina, VI, 4 to middle of VIII, (Brimley; Foster), 2 ♂, 2 ♀, [Brimley and Cornell Univ. Clns.].

Southern Pines, N. C., VII, 5 and 9, 1915, (A. H. Manee), 2 ♀, [Hebard Cln.].

Johnson City, Tennessee, VIII, 27, 1903, (A. P. Morse), 3 juv. ♂, [Morse Cln.].

Decatur, Alabama, (B. Shimek), 3 ♂, [Hebard Cln.].

Madison, Wisconsin, VI, 16 to VII, 9, 3 ♂, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.].

St. Anthony Park, Minnesota, IV, 2, 1896, 1 juv. ♂, [Hebard Cln.].

Iowa City, Iowa, IX, 24 and XI, 19, 1908 and 1915, (M. P. Somes), 1 ♂, 1 ♀, [Somes Cln.].

Hamburg, Ia., IX, 5, 1914, (M. P. Somes), 1 juv. ♂, [Somes Cln.].

Mountain Grove, Missouri, VIII, 14, 1916, (for Somes), 1 ♂, [Somes Cln.].

Lincoln, Nebraska, VI and VIII, (♂ at light), 1 ♂, 1 ♀, [Hebard Cln.].

Denver, Colorado, III, 21, (Beale), 1 ♀, [Hebard Cln.].

Denton, Texas, V, 28, 1906, (F. C. Bishopp), 1 ♂, [U. S. N. M.].

Marathon, Tex., 3940 feet, VIII, 26, 1912, (Rehn and Hebard), 1 ♀, [Hebard Cln.].

Alamogordo, New Mexico, (von Krockow), 2 ♂, [A. M. N. H.].

Grand Canyon, Arizona, 1 ♂, [Bklyn. Inst.].

Prescott, Ariz., VII, 14, 1904, (R. E. Kunzé), 1 ♂, 1 ♀, [Hebard Cln.].

Nogales, Ariz., VI, 20, 1903, (E. J. Oslar), 1 ♂, [U. S. N. M.].

Redlands, California, I, 20, 1899, 2 ♂, [U. S. N. M.].

Los Angeles, Cal., VII, 1886, 1 ♂, [Hebard Cln.].

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PERIPLANETA Burmeister

1838. *Periplaneta* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 502.
1864. *Cacerlaca* Saussure, Mém. Hist. Nat. Mex., Orth., p. 69.

The present genus includes numerous species, three of which are generally distributed over the warmer regions of the Earth; these three were included with the original description, two others there given being later placed in other genera. The genus shows its greatest specific numerical abundance in Asiatic and African regions.

GENOTYPE: *Periplaneta americana* [*Blatta americana*] (Linnaeus), selected by Kirby in 1890.[286]

Generic Characters.—Sexes similar. Antennae very long and slender. Pronotum convex, deflexed laterad, roundly trapezoidal, not covering vertex of head. Latero-caudal angles of mesonotum, and metanotum not produced as slender, membranous processes.[287] Tegmina coriaceous, usually extending beyond the apex of the abdomen;[288] veins of discoidal and scapular fields, excepting the heavy humeral trunk, equally distinct and frequently branching, the whole radiating and with division between the discoidal and scapular fields not defined beyond the middle portion of the tegmen. Wings with anterior field semi-coriaceous; area of costal veins moderately broad, with costal veins frequently forking; median vein obsolete proximad; ulnar vein with few, brief, irregular, incomplete rami proximad, forking into many complete distal rami, most of which show subsequent furcation; axillary vein with numerous straight rami. Cerci elongate. Male subgenital plate symmetrical, with similar, elongate, slender styles, situated in symmetrical sockets latero-distad. Limbs elongate and slender. Cephalic femora with ventro-cephalic margins armed with a row of heavy, moderately elongate spines, which are slightly longest meso-proximad and are terminated distad by three spines, more elongate in increasing ratio distad; other ventral femoral margins supplied with heavy, elongate spines, these least numerous on the caudal

[286] Sci. Proc. R. Dublin Soc., vi, p. 562.

[287] Such productions are diagnostic for males of the genus *Pseudoderopeltis*, which are otherwise similar to males of *Periplaneta;* the females of that genus, however, show very great differences from the opposite sex.

[288] The tegmina are usually slightly longer in males than in females.

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margins of the cephalic femora and showing the greatest length on the caudal margins of the median and caudal femora. External tibial spines tri-seriately arranged. Tarsi very elongate; first four joints each supplied with a small distal pulvillus. Arolia small, truncate distad.

Periplaneta americana (Linnaeus) (Plate VII, figures 3 to 11.)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]

1773. *Blatta kakkerlac* DeGeer, Mem. l'Hist. Ins., iii, p. 535, pl. 44, figs. 1, 2 (♂), 3 (♀). [Meridional South America, [Surinam].]

1901. *Periplaneta americana colorata* Rehn, Trans. Am. Ent. Soc., xxvii, p. 220. [♀ (nec ♂), Cuernavaca, Morelos, Mexico.]

DeGeer admittedly gave the name *kakkerlac* to the species described by Linnaeus as *americana*. Shelford has shown[289] that the types of *americana* and other species collected by Rolander and described by Linnaeus, probably belonged to DeGeer, and were subsequently again described by that author. Thus we may safely assume that, though Linnaeus' description of *americana* is extremely unsatisfactory, the characters described and shown in the figures of the synonymous *kakkerlac* by DeGeer, fix the species' identity beyond doubt.

The specimen described as *americana colorata* by Rehn, is before us. It is clearly a mere color variant, with marginal caudal band of pronotum as normal in *P. brunnea*, and is not worthy of name recognition.

The established synonyms of the present species are *Blatta kakkerlac* DeGeer, *Blatta aurelianensis* Fourcr., *Blatta siccifolia* and *aurantiaca* Stoll, *Periplaneta stolida* Walker and *Periplaneta americana* variety *colorata* Rehn.

This is a large, shining, reddish brown insect, with paler pronotum showing two large, but weakly defined, spots meso-cephalad and a marginal suffusion caudad of the general darker coloration. It is the largest of the North American species of the genus, having the most decidedly caudate organs of flight, agreeing rather closely in coloration with *brunnea*, but normally with pronotum showing the paired meso-cephalic blotches more decided and the marginal caudal band and lateral suffusion less intense. In both species,

[289] Trans. Ent. Soc. London, 1907, p. 456, (1908).

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however, decided color variation occurs and occasionally size variation makes it necessary to examine material carefully before definitely correct determinations can be given for females. The two other North American species of the genus, *australasiae* and *fuliginosa*, show distinctive features, not only of structure, but of coloration as well.

Characters of Male.—(Yuma, Arizona.) Size large, form stout. Head elongate;[290] interocular space narrow, less than one millimeter in width, interocellar area forming an obtuse angle with ocellar areas; ocelli pale and distinct. Pronotum weakly convex, the convexity more decided narrowly laterad, disk with broad but shallow oblique sulci; margin above head transverse, thence lateral margins are divergent and weakly convex to slightly beyond mesal point, thence weakly convergent and convex to caudal angles, caudal margin broadly convex; all angles very broadly rounded. Tegmina and wings elongate and fully developed. Dorsal surface of abdomen unspecialized, with latero-caudal angles not produced and bluntly rounded. Supra-anal plate entirely subchitinous, represented by a hyaline mantle which extends for half its length beyond the subgenital plate, lateral margins weakly convergent and weakly convex to an acute angulate median emargination, which extends about one-third the distance to the base of the plate, apices of extremities thus formed rounded. Styles very elongate and tapering to very slender apices. Sinistrad within the anal chamber, an elongate, stout, chitinous arm extends caudad, with apex acute and curved dorsad and bearing on its distal face a minute, narrow, subchitinous flange; dorsad, just before the distal extremity, another short, acute projection occurs, directed distad. Above this arm a partially chitinous projection, of equal length, is directed dextrad, with swollen, transverse, chitinous apex giving it the form of a rounded T. Dextrad within the anal chamber, cephalad of a rounded, chitinous lobe, project dorsad two processes, directed sinistrad, which are connected at their bases, these taper evenly to their aciculate apices, with dorsal margin of dorsal process sharply serrate. At the base of this organ and hidden by the lobe, are very complex, convolute, soft processes with a slender, curved, chitinous process wound about their base. Subgenital plate small, transverse, free margin moderately convex to style sockets, between these broadly transverse; styles symmetrical, very elongate, slender, cylindrical processes, over twice the length of the subgenital plate. Limbs elongate and slender.

Characters of Female.—(Decatur, Alabama.) Agrees with male except in the following features. Form stouter. Head and pronotum in consequence proportionately broader, interocular space nearly two millimeters wide. Ocellar area not as strongly defined, but ocelli equally distinct. Pronotum much more evenly convex, with discal sulci subobsolete. Tegmina and wings less elongate, extending to apices of cerci. Supra-anal plate weakly tectate, entirely chitinous, lateral

[290] The head is found to be decidedly shorter in some individuals, in such being much nearer the normal type found in *P. brunnea*.

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margins convergent and weakly convex to an acute-angulate median emargination, which extends nearly half the distance to base of plate. Subgenital plate as typical for the Blattinae (pl. VII, fig. 9).

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Philadelphia, Pennsylvania	29.7	7.6	9.1	29.6	9.2	6.4	11.9
Thomasville, Georgia.....	30.2	8.2	9.8	31.1	9.9	7	13.4
Thomasville, Georgia.....	34.2	9.6	11.3	35.6	11.1	7.1	15.7
Big Pine Key, Florida.....	29.3	8.2	10.3	30.2	9.8	6.7	12.8
Big Pine Key, Florida.....	33.3	9.3	11.3	35.4	10.4	7	15.9
Yuma, Arizona.....	32.2	8.4	10.2	30.4	9.4	6.3	13.2
♀							
Philadelphia, Pennsylvania	29.5	7.9	9.7	23.9	8.7	4.9	11
Philadelphia, Pennsylvania	28	8.4	11.2	25	9.3	5.8	12.2
Key West, Florida.....	31.6	9.4	11.8	28.4	10.6	6.9	14.3
Decatur, Alabama.....	31.8	8	11.3	27.2	9.7	6.4	13.1
Shovel Mountain, Texas..	34	9.4	11.2	27.2	9.7	6.4	13.2
Tucson, Arizona.....	27.8	8.4	10.8	23.9	8.3	6	13

The considerable size differences are due entirely to individual variation. Depauperate females sometimes closely resemble that sex of *brunnea*, the supra-anal plate is, however, always more deeply emarginate meso-distad and the cerci, though varying greatly in length, are always more slender distad.

Coloration.—Head with occiput chestnut, shading to blackish brown between eyes; face chestnut, shading laterad and on clypeus to ochraceous-tawny, ocelli buffy. Pronotum antimony yellow, with two very large blotches of chestnut, which fuse caudad and extend to margin of pronotum cephalo-laterad; caudal margin of pronotum margined with a slightly darker shade of chestnut, the lateral margins very narrowly outlined in this color; all of these markings shading gradually into the paler ground color. Tegmina and greater portion of anterior field of wings transparent, chestnut brown, except proximad on tegmina, where a deeper tone makes this portion translucent. Dorsal surface of abdomen antimony yellow, heavily washed with sanford's brown. Supra-anal plate of male transparent and colorless. Limbs ochraceous-buff, becoming tawny distad, spines tawny. In specimens of reces-

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sive coloration the pronotal blotches are tawny and greatly reduced. In rare specimens of the maximum intensive coloration these spots, fusing, leave only narrow areas of the pale basic coloration showing latero-caudad.

The young of this species are almost uniform pale brown in coloration, the darker markings very weakly indicated.

Ootheca.—A stout quadrato-ovate capsule; 7.8 by 5.2 mm. in one example before us. This shows, on its polished but microscopically roughened surface, weak, vertical indentations between the egg cells, toward the conspicuous sutural ridge. This ridge is very narrow, but bears along its free margin regularly placed, chitinous, transverse, circular disks separated by a distance about the width of an egg cell.

The present domiciliary species thrives both in tropical and mild climates over the entire world. In the United States it is certainly established farther north than any of the other species of the genus, but, as it is being continually transported by commerce beyond its native northern limit, it is a difficult matter to state just how far northward it is permanently established. In the more northern states, however, we feel certain that records of the insect should be considered adventive. It is undoubtedly firmly established as far northward as New York City. South of the United States the species is found generally over the continent and adjacent islands.

Specimens Examined: 52; 30 males, 18 females and 4 immature specimens.

New York, New York, I to XI, (W. T. Davis; in Zoo Reptile House and elsewhere), 1 ♂, 2 ♀, [Davis Cln.]; VI, 1903, (T. D. O'Connor), 3 ♂, [Hebard Cln.].

Philadelphia, Pennsylvania, I, 14 to X, 12, 1908 to 1916, 6 ♂, 3 ♀, [A. N. S. P. and Hebard Cln.].

Raleigh, North Carolina, III, 5, 1909, 1 ♂, [N. C. Dept. Agr. Cln.].

Washington, N. C., VI, 15, 1905, (G. M. Bentley), 1 ♀, [N. C. Dept. Agr. Cln.].

Asheville, N. C., V, 1 ♀, [Cornell Univ. Cln.].

Thomasville, Georgia, VI, 17, 1903, (for Hebard), 2 ♂, [Hebard Cln.].

Lakeland, Florida, XI, 7, 1911, (W. T. Davis; in hotel), 1 ♂, [Davis Cln.].

Big Pine Key, Fla., VI, 1904, (H. W. Fowler), 1 ♂, [A. N. S. P.]; VII, 6, 1912, (Rehn and Hebard; abundant in quarter-boat at Pine Channel), 1 ♂, [Hebard Cln.].

Key West, Fla., VII, 4, 1912, (Rehn and Hebard; numerous in refuse under fruit stands), 1 ♂, [Hebard Cln.].

Decatur, Alabama, (B. Shimek), 1 ♂, 2 ♀, [Hebard Cln.].

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Ship Island, Mississippi, (Lewis), 1 ♀, [A. N. S. P.].

New Orleans, Louisiana, VI, 29, 1916, (Lutz and Rehn) 1 ♂, [A. M. N. H.].

Decatur, Texas, IX, 19, 1914, 2 ♂, [Davis Cln.].

Shovel Mountain, Burnet County, Tex., X, 16, 1901, (F. G. Schaupp), 1 ♂, 2 ♀, [A. N. S. P.].

Cuero, Tex., X, 30, 1910, 2 ♂, 3 ♀, 1 juv. ♂, 1 juv. ♀, 2 small juv., [Cornell Univ. Cln.].

Tucson, Arizona, VII, 23, 1907, (Rehn and Hebard; at light), 1 ♀, [Hebard Cln.].

Phoenix, Ariz., IV, 22, 1902, (E. J. Oslar), 1 ♂, [A. N. S. P.].

Florence, Ariz., VIII, 10 to IX, 18, 1903, (C. R. Biederman), 3 ♂, [A. N. S. P.].

Yuma, Ariz., VII, 27, 1907 and X, 1, 1910, (Rehn and Hebard; at light), 2 ♂, [A. N. S. P. and Hebard Cln.].

Imperial, California, VIII, 10, 1914, (J. C. Bradley), 1 ♀, [Cornell Univ. Cln.].

Los Angeles, Cal., VII, 1886, 1 ♀, [Hebard Cln.].

Periplaneta brunnea Burmeister (Plate VII, figures 12 to 16.)

1838. *P[eriplaneta] brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 503. [♂, ♀: Chile; Demerara [=British Guiana].]

1892. *P[eriplaneta] truncata* Krauss, Zool. Anzeig., xv, p. 165. [♂, ♀: Teneriffe; Brazil; New Britain.]

Krauss, evidently relying upon a manuscript name of Brunner's, without further reference to the literature, erected the evident synonym, *truncata*. This synonymy was indicated by Kirby in 1904.[291]

The species has been generally correctly recorded in the literature; unfortunately, however, North American material of *P. fuliginosa* has been regularly assigned to the present species by Caudell, Rehn and Hebard, two records by the latter authors, however, being correct.

The species is easily determined from the male genital features; agreeing much more closely, however, with *fuliginosa* and *P. australasiae* than with the distinctive *P. americana*. With the latter species, however, females might easily be confused, the features separating these species in that sex being much less marked, as discussed under *americana*, and the coloration being of the same general character and occasionally very similar.

The insect in size averages smaller than *americana*, with tegmina and wings not as elongate, particularly in the male sex; the paired

[291] Syn. Cat. Orth., i, p. 142.

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pronotal blotches are usually less conspicuous, due in part to the normally more deeply colored suffusion at the caudal margin of the pronotum, and the more extensive dark coloration of its lateral margins. Great individual variability in the extent and intensity of these markings, however, sometimes occurs in both species, this wholly ascribable to intensification and recession of the color pattern.

Characters of Male.—(Jewfish, Florida.) Size large, but not as large as *americana;* form stout. Head short and broad; interocular space broad, about one and one-half millimeters in width; ocellar areas forming obtuse angles with interocellar area, ocelli pale and distinct. Pronotum very weakly convex mesad, the sides weakly but distinctly deflexed laterad from the discal area and showing a very weak concavity, oblique sulci of disk subobsolete; form as in *americana*, but not as deep, with caudal angles not as broadly rounded. Tegmina and wings elongate, but not as much so as in *americana*, fully developed. Dorsal surface of abdomen with median segment showing a broad and shallow concave sulcus meso-cephalad, in which is situated a heavy tuft of silky hairs, the more cephalic form a fringe directed caudad, the much larger remainder spring from the medio-longitudinal line and form heavy fringes directed latero-caudad. Four proximal dorsal abdominal segments with latero-caudal angles very sharply rounded;[202] fifth and sixth with these angles weakly acute-angulate produced in increasing ratio caudad, the latter with caudal margin showing a broad convexity meso-laterad on each side and a broad and shallow angulate emargination mesad; seventh and eighth concealed. Supra-anal plate entirely chitinous, surface shallowly concave; roughly trapezoidal in form, with disto-lateral angles broadly rounded and distal margin showing a weak convexity. Cerci moderately elongate, not as attenuate distad as in *americana*, but with apex acute. Sinistrad within the anal chamber, an elongate, slender, chitinous arm extends caudad, curving dorsad toward the apex, which itself is flattened and terminated in a thorn, curved dextrad; near the base of this not extensive distal, flattened portion, on its dorsal margin, is situated a smaller thorn, feebly curved sinistrad. Above this is situated a very elongate chitinous process, directed dextrad, with elongate, straight, aciculate apex; this process bears proximo-dorsad a small, elongate lobe, also directed dextrad. Three other short, stout, curved, chitinous, thorn-like processes occur, one dorso-mesad, the other two dextrad, springing from convolute, chitinous structures. Subgenital plate similar to that of *americana*, except that the broad transverse mesal portion of the free margin shows a weak mesal emargination and the styles are about as long as the plate. Limbs elongate and slender.

Characters of Female.—(Billy's Island, Georgia.) Much like this sex of *americana*, differing from the male in the same features. When compared with females of

[202] Sometimes a slight production of these angles is present, while in some specimens they are more nearly acute than in others.

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americana, the head is seen to be decidedly shorter,[293] the pronotum in proportion not as long,[294] the supra-anal plate smaller, with meso-distal emargination less decided and cerci less elongate and less attenuate distad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Thomasville, Georgia.....	28.5	7.9	10.8	29.9	9.9	4.9	11.9
Everglade, Florida.....	26.5	6.7	9	24.3	8.5	4.9	9.7
Everglade, Florida.....	27	7.2	9.7	27.3	8.9	5	11
Jewfish, Florida.....	25.1	7.1	10.3	27	9.2	4.7	10.2
Katherine, Texas.....	25.2	7	9.6	26.8	9.1	4.3	9.4
♀							
Billy's Island, Georgia....	28.5	7.9	10.8	23.8	9.3	5.1	10.9
Fort Myers, Florida.....	33	8.9	11.7	26.5	10	5.8	12.3
Everglade, Florida.....	29.7	8.3	10.6	24.9	9.5	5.4	11.2

Large exotic series before us show that individual size differences of moderate degree are frequent. In series of females from the same locality, decided differences are also found in pronotal amplitude. The differences in average tegminal length between the sexes is much less in *brunnea* than in *americana*.

Coloration.—In general coloration this insect agrees very nearly with *americana*, differing chiefly in the following features. Head with entire occiput dark chestnut brown, this extending to ventral margin of interocellar area. Pronotum with dark blotches usually not as decided, but with caudal margin more heavily suffused with blackish brown, this continued as a narrow peripheral margin about the pronotum. Outlines of these darker markings as vague as in *americana*. Intensification and recession of this color pattern is quite as decided as in *americana* and, in consequence, the normal color differences between the two species are sometimes obliterated.

This domiciliary insect is apparently more nearly peculiar to the tropics and adjacent regions than *americana*. It is circumtropical in distribution and from the exotic material at hand would appear to be the most abundant species of the genus, at least in tropical America. The records given below define the known distribution of the species in the United States. An additional record

[293] The length of the head, however, though normally much greater in *americana*, is found to vary to a surprising degree in that species.

[294] Enough individual variation, however, occurs in the pronotal size and form to make this character true only for the majority, not all, of the specimens compared.

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from Asheville, North Carolina, we have placed in the adventive list, as we do not believe the species can become established in as cold a climate.

Specimens Examined: 40; 22 males, 12 females and 6 immature individuals.

Billy's Island, Okeefenokee Swamp, Georgia, VI, 1912, (J. C. Bradley), 1 ♀, [A. N. S. P.].

Thomasville, Ga., IV, 1, 1903, (Hebard), 1 ♂, [Hebard Cln.].

Hastings, Florida, III, 1 to XI, 4, 1901, (A. J. Brown), 3 ♂, 4 ♀, [Morse Cln.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Hebard Cln.].

La Belle, Fla., IV, 27, 1912, (W. T. Davis), 1 ♂, [Davis Cln.].

Fort Myers, Fla., IV, 1, 1912, (W. T. Davis; at light), 1 ♀, [Hebard Cln.].

Punta Gorda, Fla., XI, 15, 1911, (W. T. Davis), 1 juv. ♀, [Davis Cln.].

Everglade, Fla., IV and V, 1912, (W. T. Davis), 5 ♂, 1 ♀, [Davis Cln.].

Miami, Fla., III, 10, 1917, (Hebard; in warehouse), 4 ♂, 3 ♀, 5 juv.; III, 18, 1917, (for Hebard; in warehouse), 5 ♂, 2 ♀, [Hebard Cln. and A. N. S. P.].

Jewfish, Fla., VII, 11, 1912, (Rehn and Hebard), 1 ♂, [Hebard Cln.].

Katherine, Willacy County, Texas, VIII, 8, 1912, (Rehn and Hebard; in station), 1 ♂, [Hebard Cln.].

Periplaneta australasiae (Fabricius) (Plate VII, figures 17 to 19.)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]

In the present distinctive species the pronotal color pattern is the same as in *P. americana* and *P. brunnea*; unlike those species, however, the outline of the darker markings is very sharply defined. In coloration the species further differs from any other of the genus found in America, in having the tegmina strikingly paler in their marginal fields than elsewhere.

The established synonyms of the present species are *Blatta domingensis* Beauvois, *Periplaneta zonata* Haan and *Periplaneta repanda*, *subcincta*, *inclusa*, *emittens* and *subornata*, all of Walker.

In considering the position of this species, the coloration and unspecialized median section of the male supra-anal plate would suggest decidedly closer relationship to *P. brunnea* than to *P. fuliginosa*; the form of the greatly specialized male genital hook, however, is much nearer the type found in the latter species.

Characters of Male.—(Homestead, Florida.) Size large, form stout; but more graceful than in *brunnea*. Head much as in *brunnea*, but not as full; with interocular space slightly less than one and one-half millimeters in width. Pronotum much as in *brunnea*, but proportionately less ample and deeper, without traces of discoidal sulci and with weakly deflexed sides rounding more gradually into the

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weakly convex mesal area. Tegmina and wings elongate and fully developed, not as broad proportionately as in *brunnea*. Dorsal surface of abdomen with median segment specialized as in *brunnea*, but with sulcus somewhat deeper and silky hairs of mesal tuft shorter. Other dorsal abdominal segments much as in *brunnea*, caudal margin of sixth showing weaker lateral convexity and very shallow, mesal, angulate emargination. Supra-anal plate entirely chitinous,[295] surface weakly depressed in a weakly arcuate line between cercal bases; lateral margins concave and convergent to the broad, transverse distal margin, latero-caudal angles thus formed subrectangulate and almost acute; production of plate slightly greater than in *brunnea*. Cerci much as in that species, slightly more elongate and a very little more slender. Sinistrad within the anal chamber, an elongate, slender, flattened-cylindrical, chitinous arm extends caudad, showing arcuation ventrad, but distad curving dorso-sinistrad and narrower in this portion preceding the apical portion, to which it is subequal in length; apical portion straight, as wide as shaft before its dorsad curvature, three and one-half times as long as broad, flattened spatulate and scarcely narrowing to the broadly rounded apex, dorsad at the base of this apical portion is situated a sharp, recurved thorn.[296] Above this, a heavy chitinous arm is directed sinistrad, distad it is flattened and the dorsal and ventral margins, which are subchitinous and microscopically serrate, are straight, convergent to the acute apex. Mesad a very slender, almost straight, aciculate, chitinous process is directed dextrad, while sinistrad a large chitinous lobe is found, with caudal face deplanate and distal margin arcuato-angulate. Subgenital plate similar to that of *americana*, except that the emarginations at the style sockets are more decided, the broad transverse mesal portion of the free margin shows a marked mesal emargination and the styles are about as long as the length of the plate, thus a further specialization of the type found in *brunnea* is shown.

Characters of Female.—(Big Pine Key, Florida.) The distinctive coloration of pronotum and tegmina, alike in both sexes of the present species, serves best to distinguish the female of this insect. Compared with the male, this sex is found to be larger and more robust, with pronotum proportionately even deeper and more evenly convex in contour and outline. Tegmina and wings proportionately less elongate, showing a moderate contrast between the sexes. Supra-anal plate with mesal emargination similar to that of *brunnea*. Subgenital plate as typical for the Blattinae.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Orlando, Florida.....	25	6.9	8.7	26.2	8.4	5.2	10
Everglade, Florida.....	23.6	6.2	8.3	24.8	7.9	4.6	9.4
Homestead, Florida.....	25.5	7.2	9.3	26.3	8.4	5.1	10.2

[295] Frequently the texture of the plate is found to be more delicate toward the distal margin, this sometimes extending in a medio-longitudinal line suggesting sulcation.

[296] The distal portion of this process is consequently shaped much like a boat-hook, with blunt point. In this feature *australasiae* shows marked affinity to the otherwise very different *P. fuliginosa*.

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♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Tampa, Florida.....	24.3	8.1	10.1	22.9	8.7	5.9	10.3
Miami, Florida.....	29	8.7	11.4	25.7	9.7	—	—
Big Pine Key, Florida....	27.5	8.8	11.4	25.3	9.3	5.9	11.7
Key West, Florida.....	26	7.8	10	23.7	8.8	5.8	10.2

Similar differences to those discussed under *brunnea*, due to individual variation, are also found in this species.

Coloration.—The present insect, though showing a type of pronotal color pattern analogous to that found in *americana* and *brunnea*, is much more striking and beautiful, due to the greater intensity of the dark markings and their sharply defined margins. Head with entire occiput shining blackish brown, extending to ventral margin of interocellar area, but with a medio-vertical line in that space of ochraceous-buff, tinged with orange.[297] Pronotum ochraceous-buff with an orange tinge, caudal portion broadly margined with black, other margins very narrowly outlined in black, two large, meso-cephalic, black blotches occur which fuse meso-cephalad,[298] the margins of these markings all sharply defined. Tegmina deep bay, translucent distad, with marginal field ochraceous-buff, except for a narrow border of bay at the costal margin. Abdomen buffy, suffused with dark brown; in some females the dark brown is decided distad, with conspicuous lateral ochraceous-buff blotches on each segment. Coxae buffy, remaining portion of limbs bay.

Of the North American species of the genus, small immature examples of *australasiae* are distinctive in being generally less unicolorous, and in having a decided pale marking latero-caudad on the pronotum. In the later instars, immatures show the transition to the color pattern of the adult.

Ootheca.—A stout, rectangulato-ovate capsule; 10.2 by 5 mm. in one example before us. The surface is microscopically shagreenous, with feeble indentations between the egg cells as in *americana*. Sutural ridge distinct, but much lower than in *americana*, with

[297] This is sometimes subobsolete; rarely it expands into a triangular marking, with apex ventrad, occupying nearly the entire interocellar area.

[298] Sometimes these blotches are more widely fused and send slender rays of this color toward the caudal margin; rarely the blotches are very extensive, leaving only a narrow band of the pale coloration cephalad and a wider suffusion meso-caudad.

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serrations only showing traces of the discoidal development which is so striking in that species.

The present insect, though domiciliary, is frequently found under signs on trees near the borders of towns in peninsular Florida. This is the only region in the United States where the species is known to be firmly established, though elsewhere along the southern border, in the warmer portions, it may be brought in by commerce and become a permanent resident. The northernmost records are Fernandina, Green Cove Springs and Cedar Keys, Florida.[299] The species is circumtropical in distribution.

Specimens Examined: 25; 9 males, 7 females, 9 immature specimens.

Cedar Keys, Florida, VIII, 15, 1905, (Rehn and Hebard; under dead petiole bases of cabbage palmetto), 1 small juv., [A. N. S. P.].

Orlando, Fla., (G. G. Ainslie), 1 ♂, [Hebard Cln.].

Tampa, Fla., I, 17, 1904, (Hebard; under sign on tree), 1 ♂, 1 ♀, 1 juv. ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

Punta Gorda, Fla., XI, 14 and 15, 1911, (W. T. Davis; in abandoned house), 2 ♂, [Hebard Cln. and A. N. S. P.].

Everglade, Fla., IV, 5, 1912, (W. T. Davis), 1 ♂, [Hebard Cln.].

Ojus, Fla., II, 29, 1916, (Hebard; under sign on *Pinus caraibea*), 1 ♀, 1 small juv., [Hebard Cln.].

Miami, Fla., VII, 11 to VIII, 23, 1903, (for Hebard), 2 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.]; III, 16, 1915, (Hebard), 1 small juv., [Hebard Cln.].

Musa Isle, Miami, Fla., III, 4, 1916, (Hebard), 1 juv. ♀, [Hebard Cln.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard), 1 ♂, 1 ♀, [A. N. S. P. and Hebard Cln.].

Big Pine Key, Fla., VII, 6, 1912, (Rehn and Hebard; on quarter-boat in Pine Channel), 1 ♀, [Hebard Cln.].

Key West, Fla., VII, 3 to 7, 1912, (Rehn and Hebard; very common everywhere in town), 1 ♂, 2 ♀, 2 small juv., [Hebard Cln. and A. N. S. P.].

Periplaneta fuliginosa (Serville) (Plate VII, figures 20 to 24.)

1839. *Kakerlac fuliginosa* Serville, Hist. Nat. Ins., Orth., p. 70. [♂, North America.]

All other North American records of the present species have been incorrectly referred to *P. brunnea*.[300] The present insect is

[299] The records of this insect's appearance at more northern localities are given and discussed in the adventive list, p. 268.

[300] Either as *brunnea* or *truncata* (=*brunnea*), frequently as "variety a," of Saussure and Zehntner. Those authors in the Biologia have evidently confused material of one of the unicolorous species of the genus under *truncata*, designating such material as variety a. Without examination of the material, it is impossible to determine whether or not this material represents *P. fuliginosa*. Biol. Cent.-Amer., Orth., i, p. 74, (1893).

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the only uniformly dark colored species of the genus found in North America, and it is widely distributed in the southern States from central coastal Texas eastward. It is the only species of the genus found in these regions which is not known from other portions of the world.

Close relationship is found to the Japanese *P. picea* Shiraki,[301] the two species agreeing in color, size[302] and even in numerous features of the genitalia. In *fuliginosa* the shape of the male supra-anal plate is different, the projection of its meso-ventral specialization is divided, not rectangulate, while the apical portion of the sinistral concealed genital process is shorter.

Characters of Male.—(Jacksonville, Florida.) Size large, form stout, about intermediate between that of *P. brunnea* and *P. australasiae*. Head much as in *brunnea* but proportionately not as large, with interocular space about one and one-quarter millimeters in width. Pronotum much as in *australasiae*. Tegmina and wings elongate and fully developed, about as broad as in *brunnea*. Dorsal surface of abdomen with median segment specialized as in *brunnea*, but with sulcus distinctly deeper and silky hairs of mesal tuft shorter, though not as short as in *australasiae*. Supra-anal plate entirely chitinous, much as in *australasiae*, but with distal margin weakly emarginate, and mesad at the apex of this emargination project from beneath minute, twin, rounded projections, their surfaces composed of microscopic denticulations; these projections are seen from below to extend latero-cephalad on the ventral surface of the plate as much larger callosities, with surfaces similarly microscopically denticulate (pl. VII, fig. 22). Cerci as in *australasiae*. Sinistral specialized process within anal chamber of the same general type as found in *australasiae*, but with apical portion much more slender, no wider than the preceding curved portion, over five times as long as broad, with apex sharply rounded. Adjacent to this, dextrad, is a small, elongate, subconical, subchitinous process, covered distad with scattered, minute, subchitinous, cylindrical projections. Above, from a convolute, chitinous plate, spring two elongate, slender, adjacent, chitinous claws, directed sinistrad at the bases, but curving evenly dorsad, then dextrad. Ventro-mesad is another corneous production, bearing dorso-sinistrad a short process, shaped like a half-section of tubing, from within the base of which projects a

[301] We are able to determine this from a large series of Japanese specimens of *P. picea* before us.

[302] Serville's *P. pallipalpis* described in 1839, from Java, is apparently a smaller insect than either *fuliginosa* or *picea*. Karny's wretchedly described *P. japonica* and *emarginata*, from Japan, appearing in a superficial key in 1908, are, as far as can be determined from such incomplete work, absolute synonyms of *picea*. Shiraki's description of *picea* was received by Karny before publication, as a footnote indicates, but no effort was made to correct the key. The probability of the above synonymy is further emphasized by the fact that, in the considerable series of Japanese roaches before us, but one dark species of *Periplaneta*, *picea*, occurs.

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very slender, slightly curved, chitinous spine. Sinistrad a large, chitinous plate, with caudal face deeply concave meso-proximad and distal margin broadly rounded, occupies the remaining area of the anal chamber. Subgenital plate of same type as in *P. americana*, but with lateral margins continued convergent and produced slightly beyond the niches formed by the style sockets, distal margin distinctly emarginate, as much as in *australasiae*, but in the present species the distal margin is broader, the margins of the emargination weakly convex and latero-caudal angles formed with lateral margins sharply rounded.

Characters of Female.—(Jacksonville, Florida.) The uniform coloration of pronotum and tegmina, alike in both sexes of the species, serves best to distinguish the female of this insect from the other North American forms of the genus. Compared with the male, the female is found to be slightly larger and distinctly more robust, with pronotum more ample. The tegmina and wings show hardly any contrast between the sexes. The supra-anal plate has the mesal emargination brief, as in *brunnea* and *australasiae*. Subgenital plate normal for the genus.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of cercus	Length of caudal tibia
Thomasville, Georgia.....	24.5	6.9	8.8	25.6	8.2	5	10.9
Jacksonville, Florida.....	26	7.3	9.2	26.6	8.7	5.9	11.5
Jacksonville, Florida.....	29	7.8	10	27.9	9.4	6.2	11.8
DeFuniak Springs, Florida.	27	7.3	9.2	28.6	8.8	6.1	11.8
Crowley, Louisiana.....	25.7	7	9.2	26	8.2	5.3	11.2
♀							
Thomasville, Georgia.....	26.9	7.2	9.7	22.7	8.6	5.4	10.6
Jacksonville, Florida.....	27.3	8	10.7	26.2	9.4	6	11.7
Jacksonville, Florida.....	25.5	8.3	11.2	26.4	9.7	6.2	11.6
Evergreen, Alabama.....	26.3	7.8	10.2	24.2	9	5.9	10.8
Evergreen, Alabama.....	29.7	8.4	11.1	25.6	9.4	6.3	12.1
Orange, Texas.....	26.3	7.7	10	24.7	8.8	5.8	10.4
Orange, Texas.....	32.5	8.5	10.9	26.4	9.3	6.1	11.6

The extremes of the series before us are all measured. Such variation as is shown by the above tables, may be wholly attributed to individual variation.

Coloration.—Shining brownish black; tegmina, mouthparts and limbs with a bay tinge. Mesonotum and metanotum ochraceous-buff, dorsal surface of abdomen gradually deepening from this color to deep bay distad. In the occasional recessive extremes the coloration is solid; bay, with a chestnut tinge on head, pronotum and limbs.

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The young of this insect are immaculate bay, tinged with chestnut.

Ootheca.—Similar to that of *australasiae*, carried with suture directed dorsad.

This species is usually encountered out of doors, in or near towns. Over its range it is frequently found under signs on trees. At Jacksonville, Florida, it was found extremely abundant on the wharves at night. In addition to the records given below, the insect has been recorded from Bainbridge, Georgia, and Fernandina, Florida.[303] It is apparently absent from peninsular Florida and the Florida Keys.

Specimens Examined: 63; 19 males, 39 females and 5 immature specimens.

Brunswick, Ga., VIII, 31, 1911, (Hebard; on hotel veranda), 2 ♀,[305] [A. N. S. P. and Hebard Cln.].

Thomasville, Georgia, I, 3, 1908, (Hebard; under sign on tree), 2 ♀, 1 with ootheca, 2 immature ♀ [304]; I, 9, 1904, (Hebard; dead on sidewalk), 1 ♂; X, 1903, (for Hebard), 1 ♀, [Hebard Cln. and A. N. S. P.].

Jacksonville, Florida, (T. J. Priddey), 1 ♀;[306] VIII, 20, 1905, (Rehn and Hebard; on wharves at night), 7 ♂, 10 ♀, 2 juv. ♂,[307] [Hebard Cln. and A. N. S. P.].

Tallahassee, Fla., IX, 1, 1915, (Hebard; hotel porch at night), 1 ♂, [Hebard Cln.].

DeFuniak Springs, Fla., VIII, 30, 1915, (Rehn and Hebard), 1 ♂, [Hebard Cln.].

Evergreen, Alabama, VIII, 4, 1915, (Hebard; common about hotel, after dark), 1 ♂, 4 ♀, 1 with ootheca, 1 juv. ♂, [Hebard Cln.].

Pass Christian, Mississippi, III, 1 ♀, [Davis Cln.].

New Orleans, Louisiana, VI, 29, 1916, (Lutz and Rehn), 3 ♀, [A. M. N. H. and A. N. S. P.]: VI, 18, 1882, (Shufeldt), 2 ♀; XI, 14, 1882, 2 ♀, [all U. S. N. M.].

Baton Rouge, La., VI, 28, 1908, (A. H. Rosenfeld), 1 ♂, [U. S. N. M.].

Crowley, La., VII, 20 to VIII, 5, 1911, (E. S. Tucker; in house), 3 ♂, [U. S. N. M.].

Jennings, La., fall of 1906, (A. G. Hammar), 1 ♂, [Cornell Univ. Cln.].

Cameron, La., VI, 10, 1905, 1 ♀, [U. S. N. M.].

Orange, Texas, VIII, 19 to IX, 2, 1914, 2 ♂, 8 ♀, 1 with ootheca, [Davis Cln.].

Victoria, Tex., VI, (Caudell), 1 ♀; VII, 27, (A. W. Morrill), 1 ♀; VIII, 10, 1900, (J. D. Mitchell), 1 ♂, [all U. S. N. M.].[308]

[303] Recorded by Rehn and Hebard incorrectly as *P. brunnea.*

[304] Series recorded by Rehn and Hebard as *P. truncata* "var." a, and later as *P. brunnea* "var." a.

[305] Recorded by Rehn and Hebard as *P. brunnea* "var." a.

[306] Recorded by Rehn and Hebard as *P. brunnea* "var." a.

[307] Incorrectly recorded by Rehn and Hebard as *P. truncata.*

[308] Incorrectly recorded by Caudell as *P. truncata* (=*brunnea*).

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Subfamily PANCHLORINAE

The species of the Panchlorinae are all almost or entirely confined to tropical regions, two being found within the limits of the United States.

The following features are considered diagnostic. Pronotum strongly produced caudad or with distinctive contour, rarely of usual Blattid type. Tegmina and wings fully developed in the majority of the species. Wings with numerous incomplete rami of the ulnar vein, intercalated triangle subobsolete or absent. Femora with ventral margins unarmed, except sometimes with a single distal spine; ventro-cephalic margins of cephalic femora smooth to heavily fringed with hairs. Tarsal joints very slender and elongate, supplied with moderate to very large pulvilli. Distinct arolia present.

PYCNOSCELUS Scudder

Blatta, *Panchlora* and *Leucophaea*[309] of authors.
1862. *Pycnoscelus* Scudder, Bost. Jour. Nat. Hist., vii, p. 421.

In addition to the widely spread genotype, several Asiatic species of the genus are known.

GENOTYPE, by monotypy: *Pycnoscelus obscurus* Scudder= *Pycnoscelus surinamensis* ([*Blatta*] *surinamensis*) (Linnaeus).

Generic Characters.—Pronotum rather strongly convex, laterad declivent; caudal margin strongly and broadly angulate produced, with apex bluntly rounded and sides feebly concave. Tegmina and wings fully developed in both sexes; reaching, to extending considerably beyond, the apex of the abdomen. Tegmina broad, broadest mesad; discoidal sectors (formed by the numerous branches of the humeral, anal and ulnar veins) weakly oblique, with minute, inconspicuous, transverse veinlets. Wings broad; area of irregular costal veins narrow, bounded by mediastine vein to near apex of wing; ulnar vein with numerous, rather strongly oblique, incom-

[309] Kirby in 1904 (Syn. Cat. Orth., i, p. 151), has attempted to sink *Pycnoscelus* in the synonymy under *Leucophaea*, and select as type of that genus, *Blatta surinamensis* Linnaeus. This action was due to the fact that he objected to genera and species based upon immature material. His action is doubly invalid, as the genotype of *Leucophaea* had already been properly selected as *Blatta maderae* Fabricius, by Rehn in 1903 (Trans. Am. Ent. Soc., xxix, p. 282), and the valid genus *Pycnoscelus* antedates the valid genus *Leucophaea* by three years. It may be further noted that *Rhyparobia*, described in 1892, falls as an absolute synonym of *Leucophaea*, described in 1865.

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plete, short, proximal rami and few, short, complete distal rami; intercalated area very narrow and feebly indicated. Subgenital plate of male without styles. Femora with ventral margins all[210] supplied with a single, stout distal spine, all of these spines short, with lateral margins minutely and microscopically serrate; ventrocephalic margins of cephalic femora fringed with hairs which are regularly placed, the more proximal the longest, the shorter distal hairs spiniform.[211] Tarsi elongate and slender; ventral surface of elongate metatarsus fully occupied by an elongate, attenuate pulvillus, ventral surfaces of three succeeding tarsal joints each fully occupied by a large pulvillus. Arolia small.

Pycnoscelus surinamensis (Linnaeus) (Plate VIII, figure 1.)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]
1862. *Pycnoscelus obscurus* Scudder, Proc. Bost. Soc. Nat. Hist., vii, p. 422. [juv. ♀ (*nec.* ♂); Greenfield, Massachusetts.] (Unquestionably adventive.)

The additional established synonyms of the present species are *Blatta indica* Fabricius, *Blatta melanocephala* Stoll, *Blatta punctata* Eschscholtz, *Blatta corticum* Serville and *Panchlora celebesa*, *submarginata* and *occipitalis* Walker.

The present species is circumtropical in distribution, extending its range frequently into subtropical regions. It is distinctive in appearance, the only confusion which could occur with other species found in the United States would be with *Leurolestes pallidus*[212] (*Nauphoeta laevigata* of authors), which species is only superficially somewhat similar in general appearance.

Characters of Female.[213]—(Miami, Florida.) Form robust, structure rather heavy. Head flattened; eyes well developed; interocular space equal to that between the pronounced ocellar spots; ocellar areas with surface feebly concave; from occiput to clypeus, minute pits are scattered over the otherwise smooth surface. Maxillary palpi short and stout; third joint flattened cylindrical, nearly as long as fifth; fourth joint slightly shorter than third, with apex truncate and feebly oblique, proximal portion very slender and slightly deflexed; fifth (distal) joint enlarged and elongate, distal margin oblique and feebly convex from apex to near base of joint. Pronotum

[210] In this feature, the present genus appears to be separable from all others of the Panchlorinae.

[211] These hairs are moderately stout and regular in position; if they were slightly heavier we would use, instead, the term chaetiform spines.

[212] See page 161.

[213] We do not give the male characters in the usual position, as that sex is unknown for the regions here under consideration, where the species may prove to be parthenogenetic.

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with glabrous surface showing minute, rather widely scattered pits; lateral portions fully as chitinous as disk, moderately declivent, with margins very broadly cingulate, though but little raised. Length of tegmina and wings somewhat variable, these falling slightly short of, to extending well beyond, the abdominal apex. Tegmina, proximad, thickly supplied with minute pits, these are in series laterad of each vein. Wings transparent, except in narrow area of the irregular costal veins and distal portion of anterior field, where they are translucent. Dorsal surface of abdomen unspecialized. Supra-anal plate feebly and briefly convex above bases of cerci, with free margin there feebly concave; large mesal portion transverse. subtruncate, weakly concave except for a weak medio-longitudinal carinula, distal margin broadly convex, showing a trace of mesal emargination.[214] Styles very short, joints much fused, acuminate tip flattened, dorsal surface weakly convex, ventral surface more strongly convex proximad. Subgenital plate very large, surface convex; distal margin convex, except meso-laterad at base of styles, where it is broadly and shallowly concave, mesad the convexity is weak. Armament of limbs, pulvilli and arolia, as given in generic description. The median and caudal femora have the genicular spine more elongate than the single distal spine of each ventral margin.

Characters of Male.—(Pringabaja, Lombok, Lesser Sunda Islands.[215]) Agrees with the female except in the following characters. Form slightly less robust, structure not as heavy. Interocular space narrower, about three-fifths as wide as that between the similar ocellar spots. Tegmina and wings decidedly more elongate, extending distinctly further beyond the abdominal apex than in any female before us. Supra-anal plate decidedly more delicate in structure, subchitinous, more produced, without medio-longitudinal carinula and with distal margin more evenly convex mesad, not broadly flattened. Cerci short, stout proximad, dorsal surface weakly convex, ventral surface more strongly convex proximad; first eight joints brief, with lateral margins narrowly compressed, tapering rather sharply to slender ninth and tenth joints, the ninth twice as long, the tenth three times as long, as one of the more proximal joints. Meso-dextrad, from below, an elongate oval, delicate, subchitinous plate is directed dorsad in the anal chamber, tapering evenly distad to the acute apex.[216] Subgenital plate springing from bases of cerci, small but broad and little produced, distal margin subsinuato-convex. Styles absent.

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
♂						
Pringabaja, Lombok....		16.8	4.8	5	18.9	6
♀						
Miami, Florida.....	(53)	16.3–23	4.8–5.8	5.9–7.6	13.6–19	5.6–7

The extremes of size in the entire series before us, are shown by the females measured above.

[214] In some specimens, the median carinula and this trace of emargination are obsolete.

[215] This specimen, from the Fruhstorfer material, was taken in April, 1896, and is now in the collection of the Academy of Natural Sciences.

[216] This is only a portion of the complex concealed genitalia, which here can not be further discussed without damaging the specimen.

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Coloration.—(Intensive.) Shining blackish brown. Head, from vertex to clypeus, this color; ocellar spots, genae and clypeus, buffy. Limbs, proximad, suffused ochraceous-buff; tibiae and tarsi russet, the latter paler. Tegmina translucent, blackish chestnut brown; marginal field ochraceous-buff, wholly, or in part, heavily suffused with blackish chestnut brown, cingulate costal margin blackish chestnut brown. Abdomen with dorsal surface dark brown, deepening caudad; ventral surface polished, broadly margined with blackish brown, shading rapidly into brilliant, suffused cinnamon rufous in large mesal portion. Pronotum shining blackish brown, with marginal traces of buffy latero-cephalad. In specimens of the maximum recessive coloration this pale area forms a marginal band, moderately broad cephalad and continued along the lateral margins of the pronotum to near the latero-caudal angles, while the tegmina are transparent, light ochraceous-buff, with numerous microscopic dots of brown[317] and humeral trunk blackish brown proximad. In such specimens the dark portion of the head sometimes shows a slightly paler transverse marking, between the points of juncture of the eyes and ocellar areas. Every degree of variation, from the maximum intensive to the maximum recessive type of coloration, occurs.[318]

General coloration of immature examples, deep chestnut brown to blackish chestnut brown.[319] Head, pronotum, mesonotum, metanotum, median segment, first two dorsal abdominal segments and ventral surface polished, with very minute, scattered, microscopic punctae on head and dorsal polished portions. Remaining dorsal portion of abdomen microscopically finely shagreenous, showing raised and polished points on third segment and fewer raised points on the remaining segments. Head of general coloration, shading to slightly paler on the occiput, cingulate margins

[317] Under the microscope these dots are seen to be arranged in lines between the tegminal veins, each dot representing pigmentation of a minute pit. These lines of dots become more and more broken distad and disappear before the distal portion of the tegmen is reached. To the naked eye, the effect is of a moderate proximal suffusion of the transparent tegmina.

[318] The single Malaysian male before us is of the maximum recessive type of coloration.

[319] Occasional specimens are found of paler general coloration. These represent individuals which, when killed, had but recently reached maturity and had not yet attained their full coloration.

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of pronotum also frequently slightly paler. The ocellar spots are not as large as in the adult condition, but still prominent, only disappearing in the early instars. Ventral surface shading to buckthorn brown with a tawny tinge.

The eggs of this species are inclosed in a transparent membrane, which is found within the abdomen. The mass has the general appearance of a partially formed ootheca.

In addition to the large series from the United States, we have examined nearly two hundred specimens of this species, chiefly from the West Indies and Mexico, without finding a single male, adult or immature, from the American continent.[320] The Malaysian male before us has proportionately decidedly longer organs of flight than any female at hand, and the sex may have very different habits from the females, which, with the young, we have often found burrowing on the surface of the ground, in dust or sand under rocks, boards or other debris. The absence of even immature males, among the very large American series of immature specimens before us, may possibly indicate parthenogenesis; prolonged study of living material must be undertaken before this problem can be solved.

The species is abundant in peninsular Florida and the Brownsville region of Texas. It has been found established as far north as Jacksonville, Gainesville and Cedar Keys, Florida; New Orleans, Louisiana, and San Antonio, Texas. Elsewhere in the United States the species has occasionally become temporarily established in green-houses and places similarly artificially heated during cold weather.[321]

Specimens Examined: 126; 55 females and 71 immature females.
Jacksonville, Florida, (T. J. Priddey), 1 ♀, [Hebard Cln.].
St. Augustine, Fla., VIII, 19, 1905, (Rehn and Hebard), 1 ♀, [Hebard Cln.].
Palatka, Fla., VIII, 19, 1915, (Rehn and Hebard), 1 ♀, [Hebard Cln.].
Gainesville, Fla., VIII, 17, 1905, (Rehn and Hebard; in house), 1 ♀, [Hebard Cln.].
Cedar Keys, Fla., VIII, 15, 1905, (Rehn and Hebard), 3 ♀, [Hebard Cln.].
Tampa, Fla., I, 17, 1904, (Hebard), 1 juv. ♀, [Hebard Cln.].
Punta Gorda, Fla., XI, 13, 1911, (W. T. Davis; under board), 1 ♀, [Hebard Cln.].

[320] Brunner states that not a single male was present in his series of over forty specimens from tropical America, and that he had representatives of that sex, only among those which belonged to the small condition found in the East Indies. Nouv. Syst. Blatt., p. 280, (1865).

[321] See page 269.

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New Smyrna, Fla., III, 1905, (A. N. Caudell; bred adult XI, 1905), 1 ♀, [U. S. N. M.].

Miami, Fla., I, 28 to XI, 16, 1903 to 1916, (Hebard; for Hebard; Englehardt), 21 ♀, 41 juv. ♀, [Hebard Cln. and A. N. S. P.].

Homestead, Fla., VII, 10 to 12, 1912, (Rehn and Hebard; under debris), 1 ♀, [Hebard Cln.].

Jew Fish, Fla., VII, 11, 1912, (Hebard; in cracks of sun-baked mud), 1 ♀, [Hebard Cln.].

Long Key, Fla., III, 13 and 17, 1910, (Hebard; two under dry fibers at base of petioles of cocoanut palm, others under debris), 5 juv. ♀, [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 19 to VII, 7, 1904 to 1912, (Hebard; Rehn and Hebard), 8 ♀, 17 juv. ♀, [Hebard Cln. and A. N. S. P.].

Nairn, Plaquemines Parish, Louisiana, XI, 1892, (H. E. Weed), 3 ♀, [Hebard Cln.].

San Antonio, Texas, IX, 18 to 27, (E. Palmer), 5 ♀, 4 juv. ♀, [M. C. Z.].

Victoria, Tex., VI, 1, 1904, 1 ♀; VII, 10, 1907, (J. D. Mitchell), 1 juv. ♀, [both U. S. N. M.].

Sinton, Tex., II, 7, 1911, (C. T. Atkinson), 1 juv. ♀, [U. S. N. M.].

Brownsville, Tex., III, 19, 1908, (Jones and Pratt), 1 ♀, [U. S. N. M.]; VII, (H. Wickham), 1 ♀, [Hebard Cln.]; VIII, 5, 1912, (Hebard; on solid ground in litter under rats' nests, *Neotoma* sp.), 5 ♀, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

PANCHLORA Burmeister

Blatta of early authors.

1838. *Panchlora* Burmeister, Handb. Ent., ii, abth. ii, pt. i, 506.

The genus includes a large number of tropical American forms which separate into several groups.

Seven species were included with the original description, of which three are now separated from this genus.

GENOTYPE: *P[anchlora] pulchella* Burmeister = *Panchlora quadripunctata* ([*Blatta*] *quadripuncta*) (Stoll), selected by Rehn, in 1903.[322]

Generic Characters.—Pronotum convex, laterad declivent; caudal margin strongly and broadly angulate produced, with apex blunt and sides feebly concave: much as in *Pycnoscelus*, but with mesal portion less convex. Tegmina and wings fully developed in both sexes, extending considerably beyond the apex of the abdomen. Tegmina moderately to very broad; discoidal sectors weakly oblique. Wings broad; area of irregular costal veins narrow, bounded by mediastine vein to near apex of wing; ulnar vein with

[322] Trans. Am. Ent. Soc., xxix, p. 284.

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numerous (usually 9 to 13) short, strongly oblique, proximal incomplete rami and few (usually 3 to 4) short, distal complete rami; intercalated area very narrow and feebly indicated. Supra-anal plate of female delicate in structure, sub-bilobate. Femora with ventral margins unarmed, except frequently with a much reduced, single, distal spine on all, or some, of these margins, excepting the ventro-caudal margin of the caudal femora; ventro-cephalic margins of cephalic femora fringed with delicate hairs, the longest proximad. Tarsal joints relatively small; metatarsus hairy except ventro-distad, where a rather large, round pulvillus occurs; three succeeding joints hairy, with brief ventral surfaces each almost completely filled by a rather large, round pulvillus. Arolia moderately large, truncate distad.

Panchlora cubensis Saussure (Plate VIII, figures 2 to 5.)

1862. *P[anchlora] cubensis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 230. [♀, Cuba.]

Though many names now standing in the literature represent almost certainly synonyms of this species, examination of the types, of at least several of these, must be made before the nomenclature of the plain green species of the genus can be put on a secure basis.[223]

The present species is widely distributed throughout the greater Antilles, Mexico and Central America, its distribution extending within the limits of the United States only in the vicinity of Brownsville, Texas. The insect is frequently shipped alive into the United States, particularly in bananas, but it is an essentially out of doors tropical form and can never become established north of the tropical areas of this country.

Characters of Male.—(Brownsville, Texas.) Eyes rather broad in front, separated by a brief space which in width is usually about one-eighth the greatest diameter of the eye; ocellar areas weakly concave, ocellar spots faintly suggested. Clear margins of pronotum and tegmina weakly tessellate with greenish and in consequence slightly opaque. Tegmina and wings fully developed, normal for the genus. Supra-anal plate very short, very strongly transverse, distal margin broadly concave,

[223] See Hebard, Ent. News, xxvii, p. 217, (1916). The present species is seen to be a member of the first group of the plain species, and should be placed first in the linear arrangement of the species of the genus.

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with an obtuse-angulation weakly indicated mesad, disto-lateral angles rectangulate and rather sharply rounded. Cerci short and broad, extending far beyond distal margin of supra-anal plate, lateral margins subparallel to the rather broadly rounded apex. Subgenital plate transverse, distal margin transverse between the cerci. Small cylindrical styles situated on this margin at the inner margin of the base of the cerci, each equal to about one-third the cercal length. Cephalic femora with ventro-cephalic margins supplied proximad with a few hairs, succeeded distad by a more closely-set row of shorter hairs (with a single, distal, atrophied spine, individually present or absent). Other femora unarmed (or with a single, distal, atrophied spine, individually present or absent on the ventral margins), except dorso-distad where a small delicate genicular spine is situated slightly cephalad of the median line.

Characters of Female.—(Brownsville, Texas.) This sex agrees with the male except in the following features. Size larger. Interspace between the eyes from one-half to two-thirds the greatest diameter of the eye.[324] Supra-anal plate strongly produced, bilobate distad, this due to a deep medio-longitudinal cleft. Cerci with lateral margins weakly converging to a more narrowly rounded apex than in male. Subgenital plate with distal margin broadly convex in general outline, but almost straight at base of cerci and with a brief, moderately deep, concave, mesal emargination.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Brownsville, Texas.....	(4)	12.2–14	3.8–4.3	5–5.3	15.4–16	4.8–5
♀						
Brownsville, Texas.....	(5)	15.7–18	4.9–5.6	5.9–6.7	18.3–20.4	5.7–6.2

In the very large exotic series before us, the size variation is very much greater.

The species enjoys apparently much the widest distribution of any of the genus and exhibits much the greatest amount of variation.

The general color is light paris green, the antennae ochraceous-tawny, the lateral bands of pronotum and tegmina yellowish white. The tegmina often have a minute, inconspicuous, dark brown dot mesad in their distal half.

Specimens Examined. In addition to nearly 100 exotic specimens: 9; 4 males and 5 females.

Brownsville, Texas, V, 8, 1904, (H. S. Barber), 1 ♀, [U. S. N. M.].

Esperanza Ranch, near Brownsville, Texas, V, 29 to VII, 25, 1904, (C. Schaeffer), 4 ♂, 4 ♀, [Bklyn. Inst., Davis and Hebard Clns.].

[324] This feature is shown, by the large exotic series of *cubensis* before us, to exhibit decided variability in this species.

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Subfamily BLABERINAE

The species of this subfamily are almost entirely confined to the American tropics, extending their distribution into the temperate regions of South America.

The following features are considered diagnostic. Tegmina and wings, when fully developed, broad. Tegmina with numerous oblique discoidal sectors. Wings with numerous incomplete proximal, and complete distal, rami of the ulnar vein; no intercalated triangle or apical field is found. Femora unarmed, or supplied with few spines; when proximal spines are present on the ventro-cephalic margins of the cephalic femora, these are always followed by a fringe of hairs; ventro-caudal margins of caudal femora never supplied with a distal spine, often fringed with hairs. Tarsal joints stout, with very large pulvilli. Arolia absent.

BLABERUS Serville

1831. *Blaberus* Serville, Ann. Sci. Nat., xxii, p. 37.
1839. *Blabera* Serville, Hist. Nat. Ins., Orth., p. 74. (Emendation.)
1868. *Libisoca* Walker, Cat. Blatt. Br. Mus., p. 12.
1868. *Sisapona* Walker, ibid., p. 16.
1868. *Tarraga* Walker, ibid., p. 16.

The numerous species of this genus are peculiar to tropical America. A large number of these are probably to some degree domiciliary.

GENOTYPE: *Blaberus giganteus* (*B*[*latta*] *gigantea*) (Linnaeus), selected by Rehn in 1903.[325]

Generic Characters.—Head with vertex hidden by pronotum. Size large to very large, even for this subfamily which contains no small species. Pronotum large, elliptical to roundly hexagonal; surface convex, this more decided above the head, with a symmetrical design impressed weakly on the disk. Tegmina and wings broad, extending well beyond the apex of the abdomen, except in females of some species in which they are slightly shorter. Tegmina with numerous discoidal sectors, which are moderately oblique. Supra-anal plate rectangulate-bilobate in both sexes. Cephalic femora with ventro-cephalic margins armed with a few

[325] Trans. Am. Ent. Soc., xxix, p. 288.

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stout, rather short, proximal spines, succeeded by a closely-set row of stout hairs, terminated by a single stout, rather short, distal spine; other ventral femoral margins without spines except distad. Meta-tarsi with ventral surface occupied by an elongate, linear pulvillus, which is enlarged and rounded distad; succeeding three tarsal joints with ventral surfaces occupied by large, rounded pulvilli. Arolia absent.

Specimens representing allied genera show individual variation in presence or absence of proximal spines on the ventro-cephalic margins of the cephalic femora, and of the occasional supplementary distal spine of the ventro-caudal margins of the cephalic and median femora and ventro-cephalic margins of the caudal femora. Careful study of large series will be required, before it can be stated whether the genus *Blaberus*, as at present understood, contains two distinct generic units, or simply divides into two well-marked sections, as indicated by Saussure and Zehntner.

Blaberus craniifer Burmeister (Plate VIII, figures 6 and 7.)

1838. *Bl[abera] craniifera* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 516. [Cuba.]

1839. *Blabera varians* Serville, Hist. Nat. Ins., Orth., p. 78. (In part; ♀.) [♀, Cuba.]

1857. *Blatta (Blabera) atropos* Guérin (not *Blatta atropos* of Stoll, 1813), in Sagra, Hist. Cuba., Anim. Artic., p. 333. [Havana, Cuba.]

1864. *Blabera atropos* Saussure (not *Blatta atropos* of Stoll, 1813), Mém. Hist. Nat. Mex., iv, p. 233. [♂, ♀: Cuba; Hot coast of Mexico.]

1888. *B(labera) atropos* Bolivar (not *Blatta atropos* of Stoll, 1813), Mém. Soc. Zool. France, i, p. 133. ["Should be the most abundant species in Cuba."]

The present species shows near relationship to *B. atropos* (Stoll),[226] agreeing in the exceptionally dark general coloration of

[226] **Blaberus atropos** (Stoll)

1813. [*Blatta*] *atropos* Stoll, Natuur. Afbeeld. Beschryv., Kakkerlakken, p. 4, Register p. 14, pl. IId. fig. 8. (No locality given.)

1865. *Bl[abera] fusca* Brunner, Nouv. Syst. Blatt., p. 376. [♀, Chile.]

1868. *Blabera laticollis* Walker, Cat. Blatt. Br. Mus., p. 5. [♂, British Guiana.]

Brunner, in 1865, applied the name *atropos* to *B. discoidalis* or an extremely closely related species, and redescribed the present insect as *fusca*. Walker's *laticollis* is an evident synonym, which name was placed under *atropos* (there, however, including *craniifer*) by Kirby in 1904.

The most striking features of the species are given above. The concealed male genitalia are similar to those found in *craniifer*, but the surrounding soft median mantle has the free margin fringed dextrad with heavier chitinous teeth, showing distinct uncination,

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the tegmina and wings, in the moderately large size (for the genus) and rather broad form. The confusion in the literature is in large part due to the fanciful death's-head marking, figured and described for *atropos*, and in that species situated on the mesonotum and metanotum. In the present species the dark pronotal spot bears pale markings, which afford an even more striking fanciful resemblance to the human eyes, nose and mouth, and failure to recognize the proper position of this marking in the two species has resulted in constant confusion.

The most striking features of difference between the species are as follows. In *craniifer* the male averages distinctly smaller than the female; with pronotum decidedly smaller, the length being contained in the width nearly 1.4 times in the male and 1.49 times in the female. The interocular space in the male is slightly less than, to slightly more than, half the interocellar width; in the female slightly more than half, to slightly less than, the full interocellar width. The dark pronotal spot contains four pale markings suggesting the human eyes, nose and mouth, these very rarely in part obliterated. The tegmina are dark blackish brown with a prout's brown tinge, and have the proximal portions of the marginal and anal fields strikingly buffy, the extent of these markings variable and their distal margins extremely irregular but sharply defined; frequently, and particularly in the males, a large transverse suffusion of buffy is, to varying degrees, weakly indicated mesad on the tegmina.

while sinistrad these are further developed into relatively much larger chitinous processes, rounded distad, with surfaces shagreenous, the largest being situated proximad, which projection is apically irregularly bilobate.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Caparo, Trinidad.	(8)	42.7–49.1	13.3–15.3	19.3–21.6	50.8–56.4	19.2–20
♀						
Caparo, Trinidad.	(14)	57–58.8	14.6–15.9	20.8–22.9	55–57.8	22–23

Specimens Examined: 27; 10 males and 17 females.

Diego Martin, Trinidad, VI, 20, 1915, (R. A. Wood; river estate), 1 ♀, [Hebard Cln.].

Caparo, Trinidad, VI, 1913, (S. M. Klages), 2 ♂, 3 ♀, [A. N. S. P.]; VIII, 1913, (S. M. Klages), 8 ♂, 13 ♀, [Hebard Cln.].

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In *atropos* the difference in size of the sexes is much less apparent; the pronotum averages only slightly smaller in the male, the length being contained in the width about 1.43 times in both sexes. The interocular space in the male is slightly more than half, to fully, the interocellar width; in the female slightly less than, to fully, the interocellar width. The dark pronotal spot is normally solid; faint traces of a portion of the same type of marking as found so conspicuous in *craniifer* are apparent in rare examples. The tegmina are dark blackish brown with an argus brown tinge, the marginal fields are brownish buffy, often suffused with darker distad; the tegmina appear otherwise almost solid in coloration until spread, when the humeral trunk is found to be very dark, the anal field rather pale and the mesal portion of the tegmina rather darker than the other distal portions.

The female of *B. varians* of Serville is clearly this species; the male the same as his *B. discoidalis*.

In addition to the diagnostic features described above, the following features are found in the present species.

(Key West, Florida.) Head blackish brown in general coloration, eyes often paler, ocelli and soft portions of clypeus conspicuously buffy. Ocelli distinct; flattened surfaces of ocellar areas slanting mesad, so that the inner margins are raised slightly above the flattened intervening portion of the face. Pronotum subelliptical, the cephalic and caudal margins almost equally convex, this slightly more pronounced mesad on both margins, the latero-caudal angles faintly indicated by a slightly greater convexity there of the caudal margin. Tegmina broad, broadly rounded distad, with apex mesal in position. Wings with anterior field decidedly suffused with brown, posterior field less suffused, all veins dark brown. Dorsal surface of abdomen in both sexes with seventh segment acute-angulate produced latero-caudad, with apices of productions blunt; eighth much narrower across abdomen and but slightly projecting beyond caudal margin of seventh, with small, rounded, latero-caudal projections; ninth still narrower across abdomen, with caudal margin straight. Supra-anal plate projecting and subquadrate, moderately bilobate. Cerci moderately slender, slightly incurved, tapering distad to acute apex, with about seventeen short joints; polished and slightly convex above, strongly convex and very hairy below, with narrow, deep, lateral channels on external and distal portion of internal margins. Mesad in the anal chamber of the male, from above a soft surrounding mantle, a moderately stout, short, tapering, blunt, chitinous projection extends caudad; the surrounding mantle having the free dorsal and distal margins fringed with minute, chitinous teeth. Dextrad of this organ, from a broad chitinous base, a stout subchitinous shaft is directed caudad curving

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regularly outward, the convex surface is subchitinous, the inner surface soft, the apex more chitinous, not enlarged, flattened and blunt. Male subgenital plate convex, asymmetrical; distal margin broadly convex from sinistral base to mesal portion of dextral half, there rounding sharply into a deep concave emargination at dextral base, within which the margin is much softer and subchitinous; minute, slender, cylindrical styles are found on this margin at the inner bases of the cerci, the sinistral four times, the dextral six times, as long as broad. Female subgenital plate large and convex, with distal margin regularly convex to mesal portion, which is slightly produced and rounded. Cephalic femora with ventro-cephalic margins supplied proximad with three or four stout, rather short, spines, succeeded by a closely-set row of stout hairs, terminated by a single stout, rather short distal spine; other ventral femoral margins moderately hairy with similar single distal spines.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida (15)	42.2–45.1	12.3–13.6	17.3–18.9	48–51.8	18.8–19.4
♀					
Key West, Florida (28)	48.7–54.8	14.3–14.6	20.9–22.1	48–50.8	19.8–20.6

We have noted in other tropical series of this and other species of the genus that, though large series from one place seldom show very decided differences in size or marking, over the distribution of each species frequent more decided differences are found between different series.

The present species has become firmly established in the United States at Key West, Florida.[327]

Specimens Examined:[328] 54; 16 males, 28 females and 10 immature examples.

[327] It has been recorded from that locality as *atropos* by Rehn, Ent. News xix, p. 441, (1908); as *cubensis* by Rehn and Hebard, Ent. News, xxi, p. 103, (1910), and by those authors as *atropos*, Proc. Acad. Nat. Sci. Phila., 1912, p. 241, (1912), and Proc. Acad. Nat. Sci. Phila., 1914, p. 381, (1914).

[328] In addition the following exotic material is now before us.

Santiago de Cuba, Cuba, II, 24, 1902, (S. H. Hamilton), 3♂, 2♀, 1 juv., [A. N. S. P.]. (Recorded as *B. atropos* in 1903 by Rehn.)

Santiago de las Vegas, Cuba, IV, 1905, (G. Dimmock), 1♂, [U. S. N. M.].

Tekanto, Yucatan, Mexico, 1♂, [A. N. S. P.]. (Recorded as *B. trapezoideus* in 1902 by Rehn.)

Tunkas, Yucatan, Mexico, 1 juv., [A. N. S. P.].

Progreso, Yucatan, Mexico, 1 juv., [A. N. S. P.].

Merida, Yucatan, Mexico, (Gaumer), 1♂, [Hebard Cln.].

Benque Viejo, British Honduras, III, 1909, (W. H. Sligh), 1♂, [U. S. N. M.].

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Key West, Florida, VII, 7, 1912, (Rehn and Hebard; under boards in wood shed, many immature examples under nearby boards on ground), 15 ♂, 28 ♀,[329] 10 juv., [Hebard Cln. and A. N. S. P.]; XII, 28, 1909, (Harris), 1 ♂, [U. S. N. M.].

Subfamily CORYDIINAE

The Corydiinae and Polyphaginae share the distinctive character of having the wings, when present, with anal field plane, not folding fan-wise.

The following characters are considered diagnostic for the present subfamily. Head globose; ocellar areas never strongly defined; ocelli absent or very small, then with surfaces convex. Pronotum and tegmina (when present, except in hyaline portions found in some genera) thickly covered with hairs. Tegmina, when present, opaque, transparent, or partially opaque and partially hyaline; when opaque, with venation very weakly defined. Female subgenital plate simple, or valvular, with basal margins of valves forming a deep, acute-angulate emargination.[330] Limbs with ventral margins of cephalic and median femora unarmed, except sometimes distad on ventro-cephalic margins of cephalic femora and both margins of median femora. Tarsi with or without small pulvilli. Arolia present or absent.

HOLOCOMPSA Burmeister

1838. *Holocompsa* Burmeister, Handb. Ent., ii, abth., ii, pt. i, p. 491.

This genus is very widely separated from any other found in the regions here considered. Three species were originally included, of these *cyanea* and *collaris* are synonyms of *nitidula*.

GENOTYPE: *C[orydia (Holocompsa)] collaris* Burmeister = *Holocompsa nitidula* (*B[latta] nitidula*) (Fabricius), selected by Kirby, in 1904.[331]

The two adult Yucatan males differ from any others in the greater extent of the buff tegminal markings. In these specimens the entire anal field is buff, this color breaking through meso-laterad into the broad buff marking bordering the costal margin. These features represent nothing more than color variation, but give the insects a distinctive facies. The British Honduras specimen shows this condition, but the pale areas are less extensive.

[329] A number of lice are present on many of these specimens.

[330] This general type of subgenital plate is found in the Ectobiinae in *Anaplecta* and in the Polyphaginae in *Homoeogamia*. See plate VIII, fig. 11.

[331] Synon. Cat. Orth., i, p. 169.

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Generic Description.—Head orbicular; eyes widely separated; ocelli very minute but with surfaces convex; area from between ocelli to clypeal suture smooth, bullate, with a faint, percurrent, dorso-ventral median sulcus. Pronotum heavily supplied with hairs; convex, narrow lateral portions strongly declivent; cephalic and caudal margins truncate, the latter much the broader. Tegmina divided obliquely into two portions, the proximo-lateral portions opaque and hairy, the remaining portions membranous; veins of tegmina very weakly defined; distal portion of the anal sulcus conspicuous, nearly transverse. Wings equal in length to tegmina, greater portion of the venation subobsolete; discoidal vein enlarged in a very elongate costal thickening, median vein delicate, arcuate, terminating in an ovoid thickening, these two thickened areas opaque and adjacent; the proximal portions of the mediastine, ulnar and anal veins are linear and corneous, then suddenly atrophied. Dorsal surface of male abdomen unspecialized; supra-anal plate, in both sexes, convex to sub-bilobate. Subgenital plate of female convex, strongly so meso-distad, where a valvular development takes place, with basal sutures of valves straight, convergent, from the distal margin of the plate to their acute-angulate juncture. Cerci with joints very distinct in both sexes. Limbs short and rather stout. Cephalic femora with ventro-cephalic margins supplied with a row of minute, chaetiform spines, terminated by two heavy, elongate, distal spines, of which the last is much the longer; other ventral femoral margins unarmed. Median and caudal femora each supplied with a very elongate genicular spine. Tarsi relatively small; pulvilli appreciable distad on first and second tarsal joints, completely filling brief ventral surface of succeeding third and fourth joints. Arolia present, moderately well developed.

Holocompsa nitidula (Fabricius) (Plate VIII, figures 8 to 11.)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀, from description] Surinam.]

Burmeister's *cyanea* and *collaris* have been shown to represent the male and female respectively of this species,[332] the sexes of which are very dissimilar.

[332] Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1914, p. 381, (1914).

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Characters of Male.—(Key West, Florida.) Size very small, form stout, tegmina and wings projecting well beyond apex of abdomen. Head fully as broad as long; eyes very widely separated, above not extending inward beyond antennal bases; ocelli minute, oval, with surfaces convex; occiput, as far ventrad as ocelli, supplied with numerous minute hairs. Pronotum very hairy, convex, becoming strongly so laterad; cephalic and caudal margins transverse, lateral margins divergent caudad and weakly convex; cephalic angles very broadly rounded and very broadly obtuse-angulate, caudal angles broadly rounded and subrectangulate. Scutellum hairy, proportionately large. Tegmina proximad, opaque and hairy, bounded by a concave line from apex of anal vein to apex of discoidal vein; remaining distal portion delicate, hyaline. Wings delicate, hyaline, with two elongate, opaque stigmata at costal margin, which are contiguous. Cerci with eight strongly defined, rounded joints, none much longer than broad, tapering to acute apex. Supra-anal plate moderately transverse, free lateral margins weakly convex, general form subbilobate. Subgenital plate with surface convex; weakly and roundly produced sinistro-distad, with apex bearing an elongate, minute style; more weakly and more acutely produced dextro-distad, with apex bearing an even smaller, elongate style; between these productions the distal marginal surface of the plate is narrowly flattened, with the margin concave.

Characters of Female.—(Key West, Florida.) Agrees with male except in the following features. Somewhat larger and distinctly broader, with tegmina and wings less projecting beyond the apex of the abdomen. Ocelli elliptical. Supra-anal plate very weakly transverse, free margin evenly convex. Subgenital plate with surface convex, deeply and sharply acute-angulate emarginate in mesal quarter, this occupied by two valves, with surfaces weakly concave, separated by a medio-longitudinal cleft, as in *Compsodes* and suggesting a less specialized type of the condition found in *Homoeogamia* (pl. VIII, fig. 11). Limbs and armament, pulvilli and arolia, as given in generic description.

The coloration of this species affords numerous valuable specific diagnostic characters. The contrast between the sexes, in coloration, is very great.

Measurements (in millimeters)

		Length of body	Length of pronotum	Width of pronotum	Length of tegmen
♂					
Key West, Florida	(16)	4.8–5	1.6–1.8	2.1–2.2	4.4–5
♀					
Key West, Florida	(10)	5.3–6.2	1.9–2.2	2.6–2.9	4.4–5

Coloration.—♂. Head, underparts and limbs usually blackish. Antennae blackish, with a pale distal annulus, including three or four joints. Pronotum and proximal opaque portions of tegmina, black, with a weak, metallic green-blue sheen. Distal portions of

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tegmina clear hyaline, scarcely clouded. Wings hyaline, except black stigmata; margin of posterior field clouded.

♀. Pronotum mars yellow to orange rufous, often weakly suffused with dark brown at caudal margin. Head usually slightly darker; antennae similar, suffused with dark brown proximo-mesad; underparts slightly paler than pronotum. Proximal opaque portions of tegmina black, with a metallic green-blue sheen, stronger than in male; distal portions hyaline, with a faintly yellowish tinge and weakly clouded proximad and distad. Wings hyaline, except black stigmae; margins of anterior and posterior fields clouded, this not as wide as on the posterior field in the male.

The above series of twenty-six specimens, in the Philadelphia collections, represents all the material which has as yet been found established in the United States. At Key West, Florida, the species was found with *Supella supellectilium*, *Blattella germanica*, *Leurolestes pallidus* and *Periplaneta americana* in folds of burlap bags under the counter in a fruit store, and with *Blaberus craniifer* between old boards in a wood shed. The species is apparently domiciliary and widely distributed through the American tropics.

COMPSODES[333] new genus

Related to *Latindia* Stål, differing, in the male sex, in the following features.[334] Head with eyes not very widely separated, the interocular width not decidedly greater than that between the antennal sockets; disk of male pronotum almost perfectly elliptical, not decidedly truncate caudad, with a medio-longitudinal, linear sulcus and broad, but not deep, oblique sulci latero-caudad, lacking a transverse, obtuse-angulate, linear sulcus cephalad; cephalic and caudal femora of male not strikingly enlarged, the caudal femora supplied with a genicular spine as well as the median

[333] From *κομψή* and *-ώδης*, neat looking.

[334] These comparisons are made with the original description of *Latindia*, the genotype of which is *maurella* Stål, and specimens of both sexes of the genus before us, representing two species, of which one is North American.

Latindia dohrniana Saussure and Zehntner

1894. *Latindia dohrniana* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 111, pl. V, fig. 7. [♀; Guatemala.] (Tegmina fully developed.)

Motzorongo, Vera Cruz, Mexico, II, 1892, (L. Bruner), 2 ♂, 1 ♀, [Hebard Cln.].

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femora. The females of *Latindia* are quite similar to the males, in the present genus that sex is very different and entirely apterous.

GENOTYPE: *Compsodes delicatulus* (*Latindia delicatula*) (Saussure and Zehntner).[335]

The genus includes five species; *argentinus* (Rehn), *delicatulus* (Saussure and Zehntner), *cucullatus* (Saussure and Zehntner), *schwarzi* (Caudell) and *mexicanus* (Saussure),[336] males of all of which are at present before us, the female sex of *delicatulus* alone being represented or known.

Generic Description.—Size very small, form slender. Head of male rounded, hairy between eyes which are very ample, with interspace slightly less, to slightly greater, than that between the antennal sockets, ocelli obsolete. Head of female slightly more flattened, pilose between eyes which are greatly reduced, lateral, with interspace very much greater than that between the antennal sockets, ocelli obsolete. Pronotum of male very weakly convex, transverse elliptical, surface thickly covered with short hairs; disk with a distinct to subobsolete linear medio-longitudinal sulcus and broad, distinct, but not deep, oblique, latero-caudal sulci. Pronotum of female evenly and weakly convex, cephalic margin

[335] We have selected this species as the genotype, as it is the sole representative of the genus in which the female is known.

Compsodes delicatulus (Saussure and Zehntner)

1894. *Latindia delicatula* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 112, pl. V, fig. 7. [♂; Zapote, Guatemala.]

Cacao, Trece Aguas, Alta Vera Paz, Guatemala, III, 24 to IV, 26, 1906, (Barber and Schwarz), 14♂, 3♀, 3 juv. ♂, 2 juv. ♀, [U. S. N. M. and Hebard Cln.].

The following features are found to be diagnostic for this species.

♂. Interocular space three-fifths that between the antennal sockets. Pronotum almost perfectly elliptical. Tegmina with surface corrugated and heavily supplied with moderately elongate hairs, particularly distad; less ample, less smooth and supplied with much more numerous and longer hairs than in *schwarzi*. Dextral margin of subgenital plate, from style to base of cercus, fringed with moderately elongate hairs; genitalia otherwise similar to *schwarzi*. Arolia microscopic, vestigial, occasionally absent on one or all of the limbs.

In the female the eyes are separated by a distance twice that between the antennal sockets. In this sex arolia are absent.

[336] The remaining species, which have been described as members of *Latindia*, are variously distinctive in important features, which will probably necessitate the erection of one or several additional new genera.

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broadly rounding to caudal margin, which is straight, transverse, with latero-caudal angles rather sharply rounded, surface microscopically pilose. Mesonotum and metanotum of female with latero-caudal angles weakly acute-angulate produced, with apices broadly rounded; entire dorsal surface microscopically pilose. Tegmina and wings fully developed in male, absent in female. Tegmina pilose, with marginal and scapular fields very narrow, veins and diagonal channel distinct, discoidal sectors oblique. Cerci of male elongate, with distinct joints, tapering to the apical joint, which is aciculate; of female short, submonolithiform, tapering to the acute apex. Subgenital plate of female valvular, with bases of valves straight, convergent from the distal margin of the plate to their acute-angulate juncture. Limbs very slender in male, somewhat heavier in female. Femora unarmed, except for a delicate genicular spine on median and caudal femora. The caudal margin of the cephalic femora not supplied, in the male, with an exceedingly heavy, mesal, projecting tooth, followed by other smaller teeth, as characteristic for that sex in *Latindia* s. s. Tarsi elongate and slender, without pulvilli. Arolia minute, vestigial or absent.

Compsodes schwarzi (Caudell) (Plate X, figures 1 to 4.)

1903. *Latindia schwarzi* Caudell, Proc. Ent. Soc. Wash., v, p. 165. [♂; Madero Canyon, Santa Rita Mountains, Arizona.]

This species shows close relationship to *C. mexicanus* (Saussure),[337] differing from that insect in the smaller size, proportionately less ample tegmina and wings and the once forked or unbranched median vein of the wings.

Characters of Male.—(Brownsville, Texas.) Size small, intermediate between that of the smaller *C. delicatulus* and the larger *C. mexicanus*. Head with inter-

[337] **Compsodes mexicanus** (Saussure)

1868. *Latindia mexicana* Saussure, Rev. et Mag. de Zool., 2e sèr., xx, p. 100.

1870. *Latindia mexicana* Saussure, Miss. Sci. Mex., Rech. Zool., Orth., p. 110, pl. II, figs. 53 to 55.

1894. *Latindia tolteca* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 113. Jalapa, Vera Cruz, Mexico, IX, (O. W. Barrett), 1♂, [A. N. S. P.].

There is little doubt but that *tolteca* is an absolute synonym of this species, as admitted possible by the original authors. Their hypothesis, as to the sex of the type, clearly amounts to no more than a wild guess.

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ocular space very slightly wider than that between the antennal sockets; vertex smooth, but thickly dotted with microscopic pits, these the sockets of microscopic hairs. Pronotum transverse elliptical, with greatest width slightly caudad of mesal point; divided by a feeble, linear, medio-longitudinal sulcus; latero-caudal oblique sulci of disk broad and shallow. Tegmina very delicate; diagonal channel very conspicuous to median vein on both tegmina; discoidal sectors not numerous (6 to 7), oblique, the majority springing from the ulnar vein, which parallels the anal sulcus to its juncture with the diagonal channel. Wings hyaline, strongly iridescent; tinged with buff and pilose in distal area of irregular costal veins; ulnar vein with three arcuate rami, complete to margin of wing. Dorsal abdominal segments unmodified. Supra-anal plate produced, very delicate, with lateral margins converging and rounding broadly into distal margin, which is weakly angulato-emarginate mesad or nearly transverse. Cerci elongate, with seven joints, these elongate and distinctly articulated, three distal joints small and sharply decreasing in size, the distal joint very sharply conical. Genital hook situated sinistrad within anal chamber, very elongate and slender, directed dextrad and curving weakly to near the apex, where the shaft is flattened and somewhat expanded, thence brief and very slender, curving sharply cephalo-dorsad to the acute apex. In addition, two curved, chitinous spikes, springing from the same base, are found sinistrad and a single heavier and blunter spike dextrad. Subgenital plate symmetrical, as broad as long, with small, slender, rather elongate styles, symmetrically placed laterad, between which the distal margin of the plate is moderately convex and broadly truncate. Limbs elongate and slender. Ventro-cephalic margins of cephalic femora fringed with short, microscopic hairs. Tarsal joints extremely elongate and slender, caudal metatarsus nearly half as long as the elongate caudal tibia. Minute, microscopic, vestigial arolia present.

The female of this species is unknown.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Esperanza Ranch, Texas...	(2)	6–6.3	1.8–1.8	2.6–2.7	7.2–7.5	2.7–2.8
Brownsville, Texas.....	(2)	5.3–6.5	1.7–1.7	2.3–2.4	6.2–6.8	2.4–2.4
Sierra El Tosti, Mexico....	(3)	5.4–5.5	1.7–1.8	2.1–2.2	6.4–6.8	2.2–2.5
San José del Cabo, Mexico..	(3)	5.3–5.9	1.6–1.7	2–2.2	6.4–7	2.1–2.6

General coloration buffy, diaphanous. Head cinnamon brown, eyes black. Underparts and limbs ochraceous-buff. Pronotum with disk dilute cinnamon brown, lateral margins transparent, tinged with buckthorn brown, moderately broad caudad, broader laterad. Tegmina transparent, buckthorn brown. Wings hya-

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line, with a faint buffy tinge, strongly iridescent; area of costal veins nearly opaque, light ochraceous-buff.

In addition to the type locality, the present species was previously known only from Brownsville, Texas.

Specimens Examined: 19; 19 males.

Beeville, Texas, X, 24 and XI, 1, (E. A. Schwarz), 2 ♂, [U. S. N. M.].

Sabinal, Tex., III, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.].

Nueces River in Zavalla County, Tex., VII, 1, 1910, (F. C. Pratt), 1 ♂, [U. S. N. M.]

Brownsville, Tex., II, 24, 1909, (F. C. Pratt), 1 ♂, [A. N. S. P.]; IV, 30, 1909, (H. S. Barber), 1 ♂, [Hebard Cln.].

Esperanza Ranch, Brownsville, Tex., VI, 1904, (C. Schaeffer), 2 ♂, [Bklyn. Inst. and Hebard Cln.].

Sabino Basin, Santa Catalina Mountains, Arizona, VIII, 15 to 21, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

Madero Canyon, Santa Rita Mountains, Ariz., VI, 7 to 14, 1898, (E. A. Schwarz), 3 ♂, *type* and *paratypes*, [U. S. N. M.].

Sierra El Tosti, Lower California, Mexico, X, 1893, (G. Eisen), 4 ♂, [Cal. Acad. Sci. and Hebard Cln.].

San José del Cabo, L. Cal., Mex., 3 ♂, [Hebard Cln. and A. N. S. P.].

ATTAPHILA Wheeler

1900. *Attaphila* Wheeler, Amer. Nat., xxxiv, p. 860.

In addition to the single North American species originally described, four likewise myrmecophilous species of the genus have since been described by Bolivar from South America.[338] The remarkable antennae, with all but the second and third joints decidedly longer than wide, are, in that author's opinion, sufficiently different from those of the other known species of roaches, to warrant the erection of a new subfamily, which he terms the Attaphilinae.[339]

Kirby, in 1904 placed the genus in the Polyphaginae.[340]

[338] Comunic. Mus. Nac. Buenos Aires, i, p. 334, (1901). (*Attaphila bergi.*)
Mitteil. Schweiz. ent. Gesellsch., xi, pp. 137 to 138, (1905). (*Attaphila aptera, sexdentis* and *schuppi.*)

[339] Comunic. Mus. Nac. Buenos Aires, i, 334, (1901).

[340] Syn. Cat. Orth., i, p. 173.

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In 1908, Shelford, without comment, placed *Attaphila* last of the genera of the Phyllodromiinae[341] (= Pseudomopinae). Though monographic studies may prove the Attaphilinae a valid subfamily, we feel that the wisest present course is to assign the genus to the Corydiinae, the numerous hairs on the exposed surfaces of the body, evenly convex head, without ocelli, in both sexes, and the ventral femoral margins armed only distad, except the cephalic margins of the caudal femora, leading us to this conclusion. The apparently distinctive antennal characters found, very possibly, may be merely representative of the high specialization of a more common type to exceptional environmental conditions.

GENOTYPE by monotypy: *Attaphila fungicola* Wheeler.

Generic Description.[342]—Size minute, form elliptical. Exposed surface clothed with scattered hairs. Head very broad, ocelli and ocellar areas obsolete. Eyes greatly reduced. Antennae with all but second and third joints decidedly longer than wide. Pronotum evenly convex, with caudal margin transverse. Tegmina: decidedly reduced with venation obsolete, or absent in male; absent in female. Wings: vestigial pads or absent in male; absent in female. Dorsal abdominal segments unmodified in both sexes. Limbs stout, tarsal joints very short, without pulvilli. Cephalic femora with margins unarmed, except for a few distal hairs on the ventro-cephalic margin, terminated by a single, small, delicate spine. Median and caudal femora each with a heavy and very elongate genicular spine. Ventral margins of same supplied with a few hairs, except cephalic margin of caudal femora, which is supplied with several stout spines. Proportionately very large arolia present, completely filling the area between the exceedingly delicate tarsal claws.

[341] Gen. Ins., Fasc. 73, Orth., Blattidae, Phyllodromiinae, p. 23.

[342] The genus and species are described together by Wheeler. We give the following characters found in the type species (excepting those qualifying tegminal and wing development), which appear worthy of generic rank. Without being able to examine Bolivar's species, we can not state whether these are all attributable to *Attaphila* as restricted in the diagnosis given above. Bolivar fails to state definitely the spine formulae of the limbs. In his generic description he gives "Femures con espina apical superiormente . . . ;" certainly in part an incorrect statement, as in none of the roaches we have seen are the cephalic femora furnished with a dorso-distal genicular spine.

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Attaphila fungicola Wheeler (Plate X, figures 5 and 6.)

1900. *Attaphila fungicola* Wheeler, Amer. Nat., xxxiv, p. 860, figs. 3 to 6. [4 ♂, 2 ♀, 60 juv.; University of Texas, [Austin], Texas.]

This, the smallest species of the known North American Blattidae, is the only described form of the family found on this continent north of Mexico, in which pure symbiosis with ants occurs. The species is treated fully by Wheeler; not only is a very thorough diagnosis given, but its habits, environment and relationship with the host, *Atta fervens* Say, are also discussed in detail.

Characters of Male.—(Austin, Texas.) Size minute; form stout, elliptical; exposed surface clothed with scattered, rather elongate hairs. Head very broad, occiput extensive and evenly convex, ocelli absent. Eyes vestigial, greatly reduced, lateral, concealed except latero-ventrad by the latero-cephalic angles of the pronotum, and separated by a comparatively considerable distance from the antennal sockets. Antennae moderately stout; first joint about three times as long as its basal width, second not as wide, with length equal to width, third slightly shorter, succeeding joints increasing decidedly in length to eighth, of which the sixth is the heaviest.[343] The joints beyond the first are carried normally at a decided angle to it, laterad. Pronotum ample, evenly convex; cephalic margin straight, transverse, rounding broadly into the divergent, weakly convex lateral margins, latero-caudal angles bluntly rounded subrectangulate, caudal margin transverse, showing a slight convexity. Tegmina rhomboidal, extending laterad slightly beyond base of first dorsal abdominal segment, without trace of veins, at costal margins the more produced, rounding broadly into distal margins which are truncate, weakly oblique to sutural margins, which slightly overlap. Wings vestigial pads, with weak traces of venation. Dorsal abdominal segments unmodified, with lateral margins moderately convex and latero-caudal angles broadly rounded. Supra-anal plate very small, triangular, with apex bluntly rounded. Cerci represented by rounded lobes scarcely longer than wide, dorsal surface deplanate, ventral surface convex. Sinistrad within the anal chamber, a delicate, slender, elongate genital hook is produced caudad,[344] then curving sinistrad to apex which, due to the continued curvature, is directed cephalad, the shaft expanding very slightly distad. Meso-dextrad, adjacent to the genital hook, a sharp, straight, aciculate process is directed caudad.[345]

Characters of Female.—(Austin, Texas.) Agrees with male except in the following features. Form decidedly broader, broadly oval. Tegmina and wings absent. Mesonotum with latero-caudal angles rectangulate and sharply rounded; metano-

[343] As observed by Wheeler, the antennae in this species are always incomplete, having been clipped off by the host, *Atta fervens*. In the series before us the number of remaining joints in the different individuals ranges from 1 to 6 to 8 to 10.

[344] Normally this organ is wholly concealed, probably lying along the inner surface of the subgenital plate.

[345] This latter organ is more often apparent than the genital hook and is described and figured by Wheeler.

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tum with these angles rectangulate, but bluntly rounded. "Posterior edges of the lamina supra-analis notched in the middle. Cerci with a very clearly circumscribed linear white spot on the dorsal surface. Subgenital plate large, nearly as long as broad, evenly rounded behind."[346]

Measurements (in millimeters)[347]

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Length of caudal tibia
Austin, Texas	2.65	.945	1.65	.95	1.35	.59
Austin, Texas	2.7	1.06	1.89	.71	1.53	.59
Austin, Texas	2.7	.95	1.77	.71	1.35	—
♀						
Austin, Texas	2.45[348]	.945	1.9	—	—	.55

The dorsal contour of the insect is strongly convex, the male tegmina rounding laterad, so that the costal margins are below the lateral abdominal suture. In consequence, were the pronotum and tegmina flattened out, an increase would be found for the dimensions given.

Wheeler's figures 3 and 4 are of the dorsal aspect of the insect, thus the cephalic margin of the pronotum and the costal margins of the tegmina are not visible, due to the convexity of the dorsal surface.

Coloration.—Amber yellow, sometimes suffused with sudan brown, the suffusion strongest on the limbs. Eye facets blackish brown.

Immature specimens before us of both sexes, as stated by Wheeler, resemble the female except in the smaller size and the distinctly paler coloration.

The habits of this singular roach and its unmolested presence in large numbers in the fungous gardens of the ant, *Atta fervens* Say, are fully discussed in the paper in which the species is described. The species is known only from the type locality.

Specimens Examined: 12; 6 males, 1 female and 5 immature individuals.

Austin, Texas, II, 19, 1903, (W. M. Wheeler), 6 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀, 2 small juv., [A. N. S. P., Hebard Cln. and U. S. N. M.].

[346] The distal portion of the abdomen is, in the single female before us, drawn in and somewhat shrivelled. We consequently quote these features from Wheeler's original description.

[347] Taken under the microscope.

[348] Distal portion of abdomen retracted in this specimen.

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Subfamily POLYPHAGINAE

We follow Kirby in separating this section from the Corydiinae. These two subgenera are distinctive in having the wings, when present, with anal field plane, not folding fan-wise.

The males of the Polyphaginae show the greatest ocellar development and specialization found in the Blattidae, this constituting one of the most satisfactory single characters to separate the Polyphaginae from the Corydiinae.

In the species of the present subfamily, the sexes are exceedingly dissimilar. The females of some species differ from the males in all but a few generic diagnostic characters, such as the number of apical spines on the tibiae.

The following characters are considered diagnostic for the present subfamily. Head of males, with ocellar areas strongly defined and ocelli large, with surfaces convex; of females, greatly simplified, without strongly defined ocellar areas and ocelli represented by indistinct spots. Pronotum and tegmina (when present), thickly covered with hairs. Tegmina of males, with venation distinct. Subgenital plate of females, simple; or valvular with basal margins of valves forming a deep acute-angulate emargination.[349] Subgenital plate of male with, or without, styles. Limbs with ventral margins of femora unarmed, but very hairy; or with a single distal spine on cephalic margin of cephalic femora, or, in the females of some species, with a few nodiform processes meso-proximad on these margins. Median and caudal femora with, or without, a dorsal genicular spine. Tarsi with, or without, pulvilli and arolia.

We have thought it best to include, in the present study of this subfamily, all of the North American material before us; this representing examples from localities as far south as the state of Guerrero, Mexico. This material is by far the largest representation of the Polyphaginae ever studied, 568 specimens. All of the species found in the United States should be found in Mexico, while the correlation of the purely Mexican species is of great importance in working out the relationship of the forms distributed north of that country.

[349] This type is found in the Ectobiinae in *Anaplecta* and in the Corydiinae in *Holocompsa* and *Compsodes*.

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The North American species of the Polyphaginae, owing to Rehn's studies,[350] require but little revisionary treatment at the present time. The much larger series now available, however, offer an opportunity to ascertain further the relative values of the characters which have been used and the degrees of variation found in the different species. Moreover, numerous important male genitalic characters have been found and are here described in detail. It is evident that the genera here considered have a wide distribution in Mexico; the small series available from that country have proven most interesting and valuable, but, until extensive field work has been accomplished in the regions south of the southern border of the United States, no definite knowledge of the different species distribution in that territory can be obtained.

To the history furnished by Rehn in his revision, we may add that the subgenera, described in that paper, have since been properly raised to generic rank,[351] while names, which have been proposed for forms or races of three of the species, are here placed in their proper synonymy. The Old World genus *Polyphaga* undoubtedly includes more than one generic unit, as is shown by material in the exotic collections now before us.

None of the North American species have pulvilli or arolia.

Key to the North American Species of the Polyphaginae (based on males[352]*)*

A. Marginal and scapular fields of tegmina broad. Subgenital plate with styles. (Supra-anal plate produced in a delicate bilobate projection. Cerci jointed, evenly tapering. Cephalic femora with ventro-cephalic margin hairy, these hairs shorter distad, with a single heavy and elongate distal spine. Median and caudal femora alone bearing a single dorso-cephalic genicular spine, this spine stout and elongate. Cephalic tibiae bearing nine spines. Median and

[350] A Revision of the Orthopterous Genus Homoeogamia. Proc. Acad. Nat. Sci. Phila., 1903, pp. 177 to 192, (1903).

[351] Caudell, Proc. U. S. Nat. Mus., xliv, p. 605, (1913).

[352] Within the orifice formed by the supra-anal and subgenital plates, which we here designate as the anal chamber, we find, in males of the present group, dextrad two plate-like structures, here termed the dextro-dorsal and dextro-ventral plates, and sinistro-dorsad a long, slender, chitinous process, here termed the genital hook. These structures show features of very great specific diagnostic value and it is unfortunate that they can seldom be observed without removing the subgenital plate. It is for this reason that we term them concealed genitalia, in apposition to the wholly external or internal genitalic features.

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caudal tibiae bearing six apical spines.) (Size large. Dextro-dorsal and dextro-ventral concealed genital plates are two smooth, brief, corneous lobes; concealed genital hook facing inward in form of interrogation point and not enlarged near apex.).....**Homoeogamia mexicana** Burmeister[353]

AA. Marginal and scapular fields of elongate tegmina narrow. Subgenital plate without styles.

B. As in first parentheses under A, but with cephalic femora lacking a distal spine on the ventro-cephalic margin. Concealed genital hook curved inward. Subgenital plate not specialized.

C. Concealed genital hook not enlarged near apex. Dextro-dorsal concealed genital plate, a narrow, elongate lobe; dextro-ventral concealed genital plate very large, with surface concave (and margins irregularly rounded).

D. Size large to medium. Dextro-ventral concealed genital plate with margins very broadly and strikingly shagreenous. Interocular space normally about half as wide as interocellar space.

Arenivaga bolliana (Saussure)

DD. Size medium to rather small. Dextro-ventral concealed genital plate with margins very briefly and obscurely roughened or smooth.[354]

Arenivaga rehni new species

CC. Concealed genital hook enlarged near apex, barbed. Dextro-ventral concealed genital plate, a very large, oval lobe, with surface strongly convex (hiding in part the smaller dextro-dorsal concealed genital plate).

D. Size medium to rather small. Dextro-ventral concealed genital plate without projection. Interocular space normally less than interocellar space. Marking of pronotum not pictured..**Arenivaga erratica** Rehn

DD. Size rather small. Dextro-ventral concealed genital plate with elongate, heavy spike, directed meso-dorsad. Interocular space normally subequal to interocellar space. Marking of pronotum pictured, except in suffused condition.....**Arenivaga apacha** (Saussure)

BB. Supra-anal plate not produced, distal margin weakly convex. Cerci not jointed, not evenly tapering. Femora with margins and genicular areas very hairy but unarmed. Cephalic tibiae bearing eight spines. Median and caudal tibiae bearing seven apical spines. Concealed genital hook curved outward. Subgenital plate with specialized organ proximo-sinistrad.

[353] We have omitted reference to *gultipennis* and *aequalis* in the present key, names very probably synonyms of *mexicana*. See discussion under genus *Homoeogamia*, page 221.

[354] Owing to the lack of material over the greater portion of this species' distribution, we are unable to give the normal width of the interocular space. Decided variation occurs, see page 230.

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C. Size rather small. Pronotum strongly transverse. Tegmina with weakly oblique discoidal sectors. From base of concealed genital hook, springs another appendage of equal length, with acute, elongate, chitinous apex.

Eremoblatta subdiaphana (Scudder)

CC. Size very small. Pronotum very weakly transverse. Tegmina with longitudinal discoidal sectors. From base of concealed genital hook, springs another appendage, with acute, abbreviate, chitinous apex.

Eremoblatta hirsuta new species

Other features, requiring more detailed discussion and in consequence omitted from the above key, offer further aid in separating some of the more closely related species. The male concealed genitalic features are distinctive in each species, but can only be properly studied when the subgenital plate has been removed.

Key to the North American Species of the Polyphaginae (based on females)

Females are much heavier and broader than the males of the respective species and have the limbs decidedly heavier, with homologous spines relatively heavier and longer. In the females the length of the tarsal joints is decidedly reduced to varying degrees. As this sex is evidently a decidedly less specialized condition, much fewer specific differential characters are to be found,[355] though remarkable generic differences exist.

A. Head somewhat similar to that of male, but larger and broader, with interocular space much greater and ocelli absent. Tegmina present, of length of abdomen, corneous, the surface densely shagreenous; wings represented by brief pads. Subgenital plate valvular, compressed and decidedly produced meso-distad, with a percurrent, linear, medio-longitudinal sulcus, the nearly vertical sides of the valves longer than wide and roughly trigonal, their basal sutures convergent to their acute-angulate juncture proximad. Cephalic femora with ventro-cephalic margin hairy, these hairs more closely set, shorter and stouter distad, suggesting chaetiform spines, terminated distad by a heavy, elongate spine.

Homoeogamia mexicana (Burmeister)

AA. Head remarkably different from that of male. Tegmina and wings absent. Subgenital plate broadly convex in general form, without a sulcus or any decided production meso-distad. Cephalic femora lacking a distal spine.

[355] Indeed, as may be seen in the key, none of the characters which separate females of *Arenivaga rehni*, *erratica* and *apacha* are sufficiently decided to enable one, not familiar with females of the three species, to determine occasional individuals of this sex with certainty.

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B. Transverse clypeal swelling of face deep. Body covered with minute hairs; longer hairs along the margin, particularly cephalad. Cephalic femora with ventro-cephalic margin hairy proximad, succeeded in distal half by a rather closely set row of short, chaetiform spines.

C. Size large to medium, form suborbicular. (General color blackish; cephalic margin of pronotum often rather narrowly buff, the caudal margin of this marking brace-shaped.).....**Arenivaga bolliana** (Saussure)

CC. Size medium to rather small, form decidedly more elongate.

D. Form elliptical. General color immaculate reddish brown.
Arenivaga rehni new species

DD. Form broad ovate. General color reddish brown, often narrowly paler mesad along cephalic margin of pronotum.

E. Limbs more elongate and slender. Segments of abdomen normally each bearing laterad a more or less strongly defined darker dot.
Arenivaga erratica Rehn

EE. Limbs shorter and stouter. Segments of abdomen normally immaculate.....**Arenivaga apacha** (Saussure)

BB. Transverse clypeal swelling of face not as deep. Body thickly covered with minute hairs; very much longer hairs along the margin, particularly latero-caudad. Cephalic femora with ventro-cephalic margin bearing a few stout, very short, rather closely placed, knob-like spines proximad, succeeded in distal two-thirds by a weakly arcuate row of very widely spaced, stout, very short, knob-like spines. (Size medium small to small; form suborbicular. General color immaculate reddish brown, hairs golden.)

C. Pronotum distinctly transverse. Hairy covering heavy.
Eremoblatta subdiaphana (Scudder)

CC. Pronotum very weakly transverse. Hairy covering very heavy.
Eremoblatta hirsuta new species

The immature males approximate much more closely the adult females, than they do adults of their own sex. This is shown by the enlarged and much less specialized head, with eyes much reduced and well-defined ocelli absent (these indicated only by spots), and by the pronotal and abdominal contour.

The species found within the United States are all from the Southwest, where they represent the only forms of the Blattidae inhabiting the desert regions proper. Some species of *Parcoblatta* and *Compsodes schwarzi*, also occur in the Southwest, but are confined in distribution to the desert and semi-desert mountain areas, being rarely found out on the desert floor and then only as migrants from their preferred environment. The exotic species of the Polyphaginae are also, in large part, primarily desert inhabitants.

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HOMOEOGAMIA Burmeister

1838. *Homoeogamia* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 490.

GENOTYPE, by monotypy: *Homoeogamia mexicana* Burmeister.

This genus differs from *Arenivaga* and *Eremoblatta* in the armament of the cephalic femora in both sexes; in the male, the marginal field of the tegmina is broader and styles are present on the subgenital plate; in the female, distinctive and somewhat reduced tegmina and atrophied wings are present and the subgenital plate is valvular, the valves remarkably produced and compressed.

In both *Homoeogamia* and *Arenivaga* the male tegmina usually (except in *A. erratica*) show a faint glassy luster, never as pronounced as in *Eremoblatta*.

Homoeogamia mexicana Burmeister (Plate IX, figures 1 and 2.)

1838. *H[omoeogamia] mexicana* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 490. [♂, ♀; Mexico.]

There is every probability that both *guttipennis*[356] and *equalis*[357] of Walker are synonyms of the present species. If this is true, Saussure's *azteca*,[358] now placed as a synonym under *guttipennis*, will also be referred to the present synonymy.

Both sexes of the present species are distinctive in appearance from the species of the other American genera of the Polyphaginae. The numerous characters by which the species is distinguished are given in the preceding keys.

We would note that the styles of the male subgenital plate are situated laterad; they are moderately stout, cylindrical and about five times as long as broad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Jalapa, Vera Cruz, Mexico.....	22.5	7.4	11	29.8	10.8
Jalapa, Vera Cruz, Mexico.....	23	6.7	10.4	29.3	10
Tacubaya, Distrito Federal, Mexico.	22.5	6.7	10.7	29.6	10.8

[356] 1869. *Zetobora guttipennis* Walker, Cat. Dermapt. Saltat. and Blatt. Suppl. Br. Mus., p. 123. [♂, Eastern slope of mountains of southern Mexico.]

[357] 1871. *Polyphaga aequalis* Walker, Cat. Dermapt. Saltat. Br. Mus., v, Suppl. Cat. Blatt., p. 3. [♂, South Mexico.]

[358] 1893. [*Homoeogamia*] *azteca* Saussure, Rev. Suisse Zool., i, p. 296. [♂, ♀; [Omilteme, Guerrero, 8000 feet,] Mexico.]

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♀	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Distrito Federal, Mexico.....	21.3	7.6	12.4	19.1	9.3
Guadalajara, Jalisco, Mexico.....	24.3	8.1	13.7	21.1	9.9
Uruapan, Michoacan, Mexico.....	22.7	8.4	14.3	20.8	9.8

Coloration.—♂. Pronotum solid mars brown, deepest mesad. Head, to clypeus, blackish chestnut brown; eyes prout's brown; ocelli zinc orange; clypeus, underparts and limbs ochraceous-tawny, paler proximad on abdomen. Tegmina translucent to transparent; marginal field ochraceous-buff, with cingulate margin russet; other portions, proximad mars brown for half the extent of the anal field, thence with small, irregular, transparent, colorless patches, these becoming increasingly numerous and larger distad, as the dark ground color becomes more dilute; portion of dextral tegmen, concealed when at rest, in large part hyaline, the diagonal channel broad and polished in proximal portion. Wings hyaline, with an elongate, narrow, opaque, warm buff area meso-distad on the costal margin, the immediate costal margin beyond this tawny.

♀. Pronotum and head as in male, excepting the much reduced ocelli, which are warm buff. Limbs and ventral surface of abdomen chestnut brown. Tegmina weakly translucent, mars brown, shading distad to dresden brown with irregular, transparent blotches of buckthorn brown, these smaller than the corresponding blotches in the male. Wings hyaline, tinged with ochraceous-tawny.

In addition to a male and two females in the National Museum without data, we have had before us 14 specimens; 10 males and 4 females.

Guanajuato, Guanajuato, Mexico, (A. Duges), 1 ♀, [U. S. N. M.].

Jalapa, Vera Cruz, Mex., VI, 23, 1898, 1 ♂; VIII and IX, (O. W. Barrett), 5 ♂, [A. N. S. P. and Hebard Cln.].

Distrito Federal, Mex., VII and VIII, 1910, 1 ♂, 1 ♀, [U. S. N. M.].

Tacubaya, D. F., Mex., VIII, 1 ♂, [Hebard Cln.].

Uruapan, Michoacan, Mex., 1899, (S. N. Rhoads), 1 ♀,[359] [A. N. S. P.].

Guadalajara, Jalisco, Mex., (D. L. Crawford), 3 ♂, 1 ♀, [A. N. S. P.].

[359] Recorded by Rehn as *H. azteca*.

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ARENIVAGA Rehn

1903. *Arenivaga* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 181.
1913. *Arenivaga* Caudell, Proc. U. S. Nat. Mus., xliv, p. 605.

GENOTYPE, by original selection: *Arenivaga bolliana* [*Homoeogamia bolliana*] (Saussure).

This genus differs from *Homoeogamia* in the absence of a distal spine on the ventro-cephalic margin of the cephalic femora in both sexes; in the male, the marginal and scapular fields of the tegmina are narrower and styles are not present on the subgenital plate; in the female, tegmina and wings are wanting and the subgenital plate is simple. It agrees with *Homoeogamia* in the armament of the median and caudal femora in both sexes, and, in the male, in the character of the supra-anal plate and the incurved concealed genital hook.

In addition to other generic features given in the key, we would state that, in the male, the ocelli are decidedly produced, with face deeply concave; the supra-anal plate is very thin, bilobate, and the subgenital plate is of the same asymmetrical character as in *Homoeogamia mexicana*, but more convex, with dextro-lateral angle much more broadly rounded and distal margin decidedly more concave-emarginate. In the females, the narrow, greatly reduced eyes terminate dorsad above the antennal sockets, while the clypeal swelling terminates dorsad distinctly below a line drawn between the antennal bases (extending often as high as the ventral margins of the antennal sockets).

In the immature stages of the species of this genus, we find that the males have minute, vestigial styles present laterad on the caudal margin of the subgenital plate. In the immature females, similar vestigial styles are present, laterad on the caudal margin of the eighth ventral abdominal segment, which, with the seventh, disappears in the adult condition, the sixth ventral abdominal segment forming the subgenital plate.

Arenivaga bolliana (Saussure) (Plate IX, figures 3 to 5.)

1893. [*Homoeogamia*] *bolliana* Saussure, Rev. Suisse Zool., i, fasc. 2, p. 298. [♂, Texas.]

1904. *Homoeogamia bolliana* variety *nigricans* Caudell, Mus. Brooklyn Inst. A. & S., Sci. Bull., i, p. 107. [♂; Esperanza Ranch, Brownsville, Texas.]

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This species is much the largest of the present genus. It is closely related to *A. rehni*, but may be readily separated by its much larger size, distinctive male genital characters, and different form, coloration and pronotal marking, when present, in the female.

The males exhibit much color variation; specimens with tegmina, wings and all but the broad pale cephalic margin of the pronotum, solid blackish, with a perceptible brownish suffusion, are before us from the Rio Grande valley (Brownsville, Eagle Pass). These have been named *nigricans* by Caudell. The condition is simply the maximum of intensive coloration found in the species, and every gradation to the normal type is found in the series before us. As we have already frequently observed, in the Orthoptera color variations are by no means worthy of varietal significance, and we consequently place *nigricans* in the synonymy here.

To the given male characters, we would add the following observations.

(Waco, Texas.) Interocular width slightly less than, to slightly more than, half the interocellar width. Pronotum with angles usually sharply rounded, sometimes quite broadly rounded, as in *A. erratica;* this variation sometimes shown on one side and not on the other. Concealed genital hook proportionately very small when compared with that of *rehni* or *erratica*, shaft curving gently inward to near distal extremity, which is sharply curved inward, not enlarged, with apex sharp, directed proximad. Dextro-dorsal concealed genital plate, a large, flattened, smooth corneous finger, somewhat arcuate; dextro-ventral concealed genital plate, a large, irregular, corneous disk, strongly concave, with dorsal margins very broadly and strikingly shagreenous.

The adult female being hitherto unknown we here describe that sex.

♀; Carrizo Springs, Dimmit County, Texas. (A. Wadgymar.) [Hebard Collection.]

Description of Female. Very unlike male, apterous, size much larger, form suborbicular. Dorsal surface roughened and leathery, covered with very short, but stout, minute hairs, most of which are usually rubbed off, except along the margins of the body. Pronotum broad, cephalic margin evenly arcuate, at an angle of slightly over 90°, caudal margin weakly produced mesad, with sides broadly concave. Supra-anal plate transverse, trapeziform, with distal angles rounded; mesal third of caudal margin truncate, with an indication of mesal emargination. Subgenital plate very large, roundly produced mesad.

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Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Dallas, Texas.....(1)	21	6.2	10.2	25	9.9
Shovel Mountain, Texas(10)	18.4–23	5.6–6.2	9–9.8	23.3–24.4	9.2–9.8
Carrizo Springs, Texas.(3)	21.7–23.8	5.8–6.4	9.6–10.5	25.3–26.2	9.8–10.7
Mission, Texas.....(1)	21	6.4	10.2	25.2	10.6
Brownsville, Texas....(10)	15.7–19.6	4.8–5.6	7.7–8.9	19.2–22.3	7.7–8.8
♀				Width of mesonotum	Width of metanotum
San Marcos, Texas....(1)	20.2	7.7	12.2	15.7	16
Carrizo Springs, Texas.(2)	20–23.8	8.3–8.7	13.8–14.8	17.2–17.5	17.4–18.3
Carrizo Springs, Texas, Described specimen.(1)	23.2	8.2	14.6	18	18.2
Mission, Texas.....(1)	23.2	8.2	13.4	16.2	16.8
Brownsville, Texas...(12)	17.2–21.3	6.1–7.4	10.1–11.6	12.1–14.1	12.8–15

The above measurements show that considerable size variation is to be found in the species. The average smaller size of the Brownsville series is almost certainly due to local environmental conditions. This series is from the dense jungle brush of the river plain; the much larger specimens, normal in this respect, from Mission, but sixty miles from Brownsville, were taken on gravelly hillocks, in scattered scrub.

Some variability is shown by the material before us in the contour of various parts; often the margins of the pronotum, supra-anal or subgenital plates show irregularities.

Coloration.—♂. (Maximum recessive.) Head with eyes and face blackish brown; ocelli yellow ocher; clypeus ochraceous-buff, as are the underparts and limbs. Pronotum light ochraceous-buff, disk heavily suffused with mars brown. Tegmina transparent, light ochraceous-buff, with a few, very widely scattered flecks of prout's brown, immediate costal margin tawny distad. Wings clear transparent, with an elongate, narrow, opaque, warm buff area meso-distad on the costal margin, the margin beyond this tawny. (Maximum intensive.) Head entirely blackish brown, ocelli liver brown. Pronotum solid blackish brown, except for a broad band of ochraceous-buff along the cephalic margin. Tegmina translucent, solid blackish brown, becoming transparent distad. Wings transparent, strongly and evenly suffused with

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blackish brown. Every kind of gradation between these extremes is shown by the series before us.

♀. Dorsal surface blackish brown, usually with a bracket-shaped area of ochraceous-tawny mesad on the cephalic margin of the pronotum. Exposed ventral surface of pronotum, mesonotum and metanotum, ochraceous-orange. Limbs and ventral surface of abdomen liver brown, the abdominal segments mesad, excepting the subgenital plate, polished claret brown.

Ootheca.—A single ootheca is before us, measuring 9.4 by 5.5 mm. The moderately convex sides are polished, with numerous, very delicate, longitudinal ridges, while toward the suture, weak convexities indicate the six pairs of egg cells contained within. The ventral margin is straight, directed moderately upward at the extremities. The suture is formed by a very delicate, high ridge, with margin straight, microscopically roughened by regular and extremely numerous, minute ridges, which run obliquely to the base of the suture on its sides; at one extremity this suture is abruptly terminated, forming a right-angle and in this portion extending to the mesal portion of the extremity of the ootheca, at the other extremity it curves strongly ventrad.

At Brownsville we found the species locally numerous under debris and leaf mould under mesquite trees, and in rats' nests, *Neotoma* sp., in the jungle brush of the river plain.

The easternmost records for the species are Dallas, Waco, Victoria, Corpus Christi and Brownsville, Texas, while the westernmost records are Bosque County, Kerrville and Pecos High Bridge, Texas.[360]

Specimens Examined: 107; 56 males, 25 females and 26 immature individuals.
Dallas, Texas, (J. Boll), 1 ♂, probably taken with type, [U. S. N. M.].
Waco, Tex., VII to X, (Belfrage; common at light), 9 ♂, [M. C. Z.].
Bosque County, Tex., IX, 14 to X, 15, (Belfrage), 9 ♂, [M. C. Z. and Hebard Cln.].

[360] Scudder and Cockerell's record of this species from Las Cruces, New Mexico, applies properly to a specimen of *A. erratica* which is now before us. Saussure's record from "New Mexico" is very probably attributable to the same species, for recent very considerable field work, in Texas west of the Pecos and in southeastern New Mexico, has not produced a single specimen of the present species. Rehn has recorded males from Round Mountain, Texas, several times, and females from Austin, Texas, as this insect; the specimens upon which these records were based are before us and likewise represent large examples of *A. erratica.*

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Shovel Mountain, Burnet County, Tex., IX, 1 to X, 20, 1901, (F. G. Schaupp), 11 ♂, [A. N. S. P. and Hebard Cln.].

San Marcos, Tex., 1 ♀, [A. N. S. P.].

Victoria, Tex., III, 3, 1909, (J. D. Mitchell), 1 ♀; (J. D. Mitchell), 1 ♂, 1 juv. ♀, [U. S. N. M.].

Corpus Christi, Tex., (Mrs. S. M. Hughes), 1 ♀, [Hebard Cln.].

Brownsville, Tex., VI, 3 to 6, 1904, (H. S. Barber), 6 ♂, 1 ♀, 1 juv. ♀; VIII, 4 and 5, 1912, (Hebard and R. A. Vickery), 4 ♂, 11 ♀, 9 juv. ♂, 10 juv. ♀; XI, 20, 1907, (J. D. Mitchell), 1 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Esperanza Ranch, Brownsville, Tex., VIII, 1, (C. Schaeffer), 1 ♂, [A. N. S. P.].

Mission, Hidalgo County, Tex., VIII, 5 and 6, 1912, (Hebard; ♂ lit on bush illuminated while searching at night for *Insara*, ♀ in rats' nest, *Neotoma* sp.), 1 ♂, 1 ♀, [Hebard Cln.].

Ringgold Barracks, [near Rio Grande], Tex., (Schott), 1 ♂, 1 ♀, [M. C. Z.].

Kerrville, Tex., IV, 22, 1908, VI, 1, 1901, (F. C. Pratt; at light), 2 ♂, [U. S. N. M.].

Sabinal, Tex., VI, 2, 1910, (Pierce and Pratt), 1 ♀, 1 juv. ♀; X, 18, 1910, (F. C. Pratt; at light), 2 ♂, [U. S. N. M. and Hebard Cln.].

Knippa, Tex., VII, 3, 1910, (F. C. Pratt), 2 juv. ♂, [U. S. N. M. and Hebard Cln.].

Uvalde, Tex., VI, 18 to 20, (H. Wickham), 1 ♂, 1 ♀, [U. S. N. M.].

Nueces River, Zavalla County, Tex., IV, 30 and VI, 29, 1910, (F. C. Pratt), 1 ♂, 1 ♀, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 4 ♂, 3 ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Eagle Pass, Tex., (Horn), 2 ♂, [M. C. Z.].

Devils River, Tex., IV, 1903, (H. A. Pilsbry), 2 juv. ♀, [A. N. S. P.].

High Bridge, Pecos River, Tex., (H. A. Pilsbry), 1 ♀, [A. N. S. P.].

Arenivaga rehni new species (Plate IX, figures 6 to 10.)

Related to *A. bolliana* and *A. erratica*, but differing from both in the distinctive male genitalia and eyes, which in the male sex are normally separated by a very brief interval. From *bolliana*, the species may further be separated by the average decidedly smaller size and more slender form, and from *erratica* in the dark pronotal marking of the males, which, in the present species, appears to be always solid, not broken to varying degrees, as in the entire series of *erratica* before us.

Type.—♂; San José del Cabo, Lower California. (Gustav Eisen.) [Hebard Collection Type no. 408.]

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Description of Type.—Size rather small, form acute elliptical. Head with width between eyes very brief, much less than half that between ocelli. Pronotum convexo-trigonal, the basal line being represented by the moderately convex caudal margin; surface covered with minute hairs, cephalic margin more thickly clothed with stouter, longer hairs. Tegmina elongate, subcoriaceous and weakly glossy, apex well rounded; costal margin of tegmina and wings supplied with minute hairs, on the tegmina these become as heavy proximad as on the cephalic margin of the pronotum. Important characters of armament of limbs and genitalic features given in key. Concealed genital hook very slender, elongate, reaching to near apex of production of supra-anal plate, curving gently inward to near distal extremity, which is sharply curved inward, slightly enlarged, with apex sharp, directed proximad.. Dextro-dorsal concealed genital plate, a rather large, flattened, smooth, corneous finger, somewhat arcuate; dextral-ventral concealed genital plate, a large, rounded, corneous disk, moderately concave, with dorsal margins narrowly and feebly shagreenous. Subgenital plate bulbous, irregular in outline, shallowly concavo-emarginate distad (as given in generic discussion).

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very unlike male, apterous, size much larger, form more broadly acute elliptical. Dorsal surface finely roughened, clothed with very short, minute hairs, along the margins these hairs are longer and heavier, particularly in the cephalic half. Pronotum broad, cephalic margin arcuate at an angle of about 90°, caudal margin weakly produced mesad, with sides broadly and weakly concave. Supra-anal plate transverse, weakly trapeziform; caudal margin very broadly convex, with an indication of mesal emargination. Subgenital plate large, roundly produced mesad.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Kits Peak Rincon, Arizona		18	5	7.7	23.6	8.6
San Lorenzo, Coahuila, Mexico	(2)	17.2–18.4	5	6.9–7	19.5–21.6	7.8–8.4
San José del Cabo, Lower California, *type*		13.3	4.2	6.1	15.6	6.2
San José del Cabo, Lower California, *paratypes*	(12)	13–18	3.9–4.7	5.7–6.8	15.3–20.9	6–7.8
Comondu, Lower California	(4)	14.5–15	3.9–4.3	5.8–6.2	18.3–19.5	6.7–6.9
Sierra El Tosti, Lower California	(3)	13.7–14	4–4.2	5.8–6.1	16.3–18.3	5.9–6.1
San Pedro, Lower California	(1)	13	4.2	6.1	15.4	6.2

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		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Iguala, Guerrero, Mexico	(1)	14.5	4.1	6	17	6.4
Jojutla, Morelos, Mexico	(1)	14	4.1	6.1	16.9	6.4
♀					Width of mesonotum	Width of metanotum
San Lorenzo, Coahuila, Mexico	(8)	16.8–18.8	6.1–6.3	8.6–8.7	10.3–11.6	11.1–11.7
San José del Cabo, Lower California, *allotype*		18.7	6.3	9.6	11.7	12.1
San José del Cabo, Lower California, *paratype*	(5)	17.6–18.4	6.1–6.3	8.2–9.2	10.8–11	11.4–11.6
Sierra El Tosti, Lower California	(5)	15.8–19	5.8–6.7	8.7–10	11–12.1	11.4–12.6

The above measurements show decided size variation in the species, irrespective of geographic distribution. This feature appears to be found in all the species of the subfamily, of which we have sufficient material for such study. In the present series, frequent small males have distinctly more ample tegmina and wings than larger individuals of the same sex.

Coloration.—All of the material before us from Lower California is dried alcoholic, but the colors appear to have been changed little, if at all.

♂. General color light buff. Eyes blackish brown. Interocular space to between the ocelli, dark chestnut brown; other portions of head, underparts and limbs of general coloration. Pronotum of general coloration, with a large, meso-caudal, uniformly colored blotch of ochraceous-buff, to deep chestnut brown. This marking is sometimes broadly shield-shaped and not continued to the caudal margin of the pronotum; frequently it is continued to that margin, while in some specimens the marking expands over the entire pronotum, leaving but a narrow band of the pale general coloration on the cephalic margin, extending to, and including, the caudal angles. Tegmina of general coloration, slightly more glossy than is usual in *erratica*, more or less marked with very fine maculations of a slightly darker shade. The tegmina are frequently darkened at the base of the anal sulcus; in some blackish brown, with base of the humeral vein the same color.

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♀. General color of dorsal surface bay, often somewhat paler mesad on the proximal portion of the abdomen. Pronotum with lateral margins often with a very narrow, weakly defined, buffy border. Underparts, excepting abdomen, buffy, the face and limbs washed with orange, the tibiae slightly darker and the caudal tibiae heavily washed with bay. Ventral surface of abdomen glabrous, mahogany red to burnt sienna, the subgenital plate with rough surface approaching bay.

Note below decided color differences in other material.

Variation.—The interocular width in the males shows very marked variation in some specimens before us. In the Lower California series the majority of males are normal in this respect, a few have this interspace slightly wider, while one or two have the margins of the eyes almost touching.

The males from Iguala and Jojutla, both localities in the Rio de las Balsas drainage, agree in being very dark in general coloration; all but the cephalic margin of the pronotum is bone brown, the tegmina of this color, mottled with a slightly paler shade. A similar intensive coloration is found in *A. bolliana* and *A. apacha*. In the Jojutla specimen the interocular space is normal; in the Iguala individual it is unusually broad, nearly two-thirds as wide as the interocellar space, but the example is easily determined by the perfectly normal genitalia.

The males from Kits Peak Rincon, Arizona and those from San Lorenzo, Coahuila, are dark in general coloration, agreeing with the specimens from southern Mexico discussed above, except that the tegmina are not as dark. In the one perfect male from the latter locality, the interocular space is exceptionally broad, over two-thirds as wide as the interocellar space.

The striking differences in interocular width, size and coloration in these few specimens from so widely separated localities, in our opinion, represent only the decided variation occurring within the species. A much wider knowledge of the species and its distribution must exist before such features, known to be decidedly unstable (but not to such extreme degrees) in series from the same locality, can be fully and definitely explained.

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Specimens Examined: 68; 27 males, 18 females, 10 immature males and 13 immature females.

Kits Peak Rincon, Baboquivari Mountains, Arizona, about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.].

San Lorenzo, Coahuila, Mexico, V, (E. Palmer), 2 ♂, 8 ♀, [M. C. Z., Hebard Cln. and A. N. S. P.].

San Pedro, Lower California, Mex., 1893, 1 ♂, [Hebard Cln.].

Sierra El Tosti, L. Cal., Mex., X, 1893, (G. Eisen), 3 ♂, 5 ♀, 3 juv. ♂, 4 juv. ♀, [Cal. Acad. Sci., Hebard Cln. and A. N. S. P.].

Comondu, L. Cal., Mex., III, 1889, (C. D. Haines), 4 ♂, 1 juv. ♂, 1 juv. ♀, [Cal. Acad. Sci. and Hebard Cln.].

San José del Cabo, L. Cal., Mex., 13 ♂, 6 ♀, *type*, *allotype*, *paratypes*, 6 juv. ♂, 7 juv. ♀, [Hebard Cln., Cal. Acad. Sci. and A. N. S. P.].

Jojutla, Morelos, Mex., VIII, 4, 1903, (W. L. Tower), 1 ♂, [Tower Cln.].

Iguala, Guerrero, Mex., IX, 1888, 1 ♂, [Hebard Cln.].

Arenivaga erratica Rehn (Plate IX, figures 11 to 13.)

1903. *Homoeogamia* (*Arenivaga*) *erratica* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 187. [♂; Prescott, Arizona.]

The present insect is closely related to *A. apacha;* males may be separated by the distinctive dextro-ventral concealed genital plate in that species, while in *erratica* the interocular width is normally less than, very rarely equal to, that between the ocelli, and the pronotal marking is normally less decided and never pictured. No males of the present species before us have the tegmina much suffused with darker brown, a condition which occurs frequently in *apacha*. Females of the two species are separable by the decidedly heavier and shorter limbs in *apacha*, this most noticeable in the tibiae; in *apacha* the fringe of hairs about the cephalic margin of the body is also appreciably heavier.

This species, with *A. rehni* and *apacha*, averages decidedly smaller than *A. bolliana*, but several males of the present insect from central Texas are larger than the smallest males of *bolliana* before us. As in the other species of the group, this size variation appears to be due rather to peculiar local environmental conditions, than to purely geographic influences.

In addition to the characters given in the key, the following features are of diagnostic value in the male sex.

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The interocular width sometimes varies decidedly; normally slightly less than that between the ocelli, we have a few specimens in which these dimensions are subequal, while rarely the interocular width is decidedly less, in one example before us equalling but one-quarter that between the ocelli. Concealed genital hook small and slender, curved gently inward; apex enlarged and blunt, bearing a sharp basal tooth on the inner side directed proximad, thus resembling the barb of a fish hook. Dextro-dorsal concealed genital plate, a large, smooth, ovate, chitinous lobe; dextro-ventral concealed genital plate a flattened, chitinous plate, which shows neither shagreenous surface (as in *bolliana* and *rehni*) nor sharp projection (as in *apacha*).

The adult female not having been previously recognized, we here describe that sex.

♀; Round Mountain, Blanco County, Texas. (F. G. Schaupp.) [Academy of Natural Sciences of Philadelphia.]

Description of Female.—Very unlike male, apterous, size much larger, form broad ovate. Dorsal surface rugulose, covered with very short, but stout, minute reddish hairs, these longest along the margins of the body, particularly cephalad. Pronotum moderately broad, cephalic margin evenly arcuate at an angle of less than 90°, caudal margin almost transverse, very weakly produced mesad, with sides showing a slight concavity. Supra-anal plate transverse, weakly trapeziform; caudal margin weakly convex laterad, with mesal fifth subtruncate, showing an indication of mesal emargination. Subgenital plate very large, roundly produced mesad.

Measurements (in millimeters)

♂	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Round Mountain, Texas(3)	15.4–17.5	5.1–5.3	7.7–8	20.3–21	7.4–7.8
Carrizo Springs, Texas.(9)[361]	13.5–18	4.2–5.7	6–8.7	16.6–22	6.2–8.8
Brownsville, Texas....(9)	14.8–15.3	4.6–4.9	6.4–6.8	16.9–17.6	6.3–6.4
Jemez Springs, New Mexico.....(3)	13.5–16.5	4–4.7	5.4–6.6	17.8–20.8	7–7.8
Roebles Ranch, Arizona(3)	15–15.8	4.4–4.6	6.4–6.7	18.3–19.2	6.8–7.1
Phoenix, Arizona.....(8)	13–15	3.8–4.7	5.3–6.2	15–17.7	5.7–6.8
Cottonwood, California	13.8	4	5.8	15	6

[361] A single male furnishes the maximum measurements given, the others approximate much more closely the minimum.

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♀		Length of body	Length of pronotum	Width of pronotum	Width of mesonotum	Width of metanotum
Round Mountain, Texas		16	5.4	8.6	11	11.6
Carrizo Springs, Texas.	(6)	13.8–15.3	4.8–5.3	6.8–7.8	8.7–9.7	9.4–10.6
Sabinal, Texas.....	(4)	13.8–14.8	5–5.2	6.7–7.9	8.9–9.5	9.7–10.3
Albuquerque, New Mexico.....		11.4	4.7	6.5	8	8.6
Adamana, Arizona....		12.8	5.2	8	9.7	10
Chiricahua Mountains, Arizona.....		14.7	5.7	8.5	9.9	10.6

Coloration.—♂. This sex shows less color variation than in other species of the genus. General coloration ochraceous-buff. A brown, shield-shaped marking is situated meso-caudad on the pronotum, this is normally finely and weakly marked with a darker shade (a conspicuous development of this darker pattern giving the allied *apacha* a distinctive pictured appearance). In rare specimens of extreme recessive coloration, this blotch becomes very pale, with no darker markings whatever. In specimens of extreme intensive coloration it becomes dark brown, the markings again disappearing. In the other species of the genus, we find, in the maximum of intensive coloration, that the homologous pronotal blotch expands, covering all but the cephalic margin of the pronotum; this does not appear in any of the very large series of *erratica* now before us.

♀. General coloration, above tawny to burnt umber, the cephalic margin of the pronotum usually vaguely paler, all but the darkest individuals faintly maculate on the pronotum, mesonotum and metanotum with a darker shade, and laterad a spot of this same color is found, with rare exceptions, in the series before us, on each abdominal segment both above and below. Minute hairy covering tawny. Underparts, particularly head and limbs, somewhat paler.

This species is known to range from Waco, south to Goliad and Brownsville, Texas. Westward the most northern localities are Ballinger, Texas; Durango, Colorado; Mescalero Apache Reservation and Jemez Hot Springs, New Mexico; Adamana and Winslow, Arizona, and St. George, Utah; while in California the species is known only from single records—Cottonwood and Riverside. The species undoubtedly has an extensive distribution in Mexico,

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but is there unknown aside from our single record for the state of Sonora.

Specimens Examined: 252; 133 males, 39 females and 80 immature individuals.

Waco, Texas, V, 8 to VII, 16, (Belfrage), 4 ♂, [M. C. Z. and Hebard Cln.].

Bosque County, Tex.. (Belfrage), 1 ♂, [M. C. Z.].

Ballinger, Tex., (H. Pinkus; at light), 1 ♂, [U. S. N. M.].

Shovel Mountain, Burnet County, Tex., IX, 10, 1901, (F. G. Schaupp), 1 ♂, 1 ♀, [A. N. S. P.].

Austin, Tex., II, 19, 1903, (W. M. Wheeler), 2 ♀,[362] [A. N. S. P. and Hebard Cln.]; (W. M. Wheeler), 2 ♀, 1 juv. ♂, [Am. Mus. Nat. Hist.].

Round Mountain, Tex., (F. G. Schaupp), 3 ♂, 1 ♀,[363] [A. N. S. P.].

Georgetown, Tex., (E. Palmer; in cave), 5 ♂, 3 ♀, 5 juv. ♂, [M. C. Z., Hebard Cln. and A. N. S. P.].

Goliad, Tex., VII, 28, (R. A. Cushman), 2 ♂, [U. S. N. M. and Hebard Cln.].

Brownsville, Tex., IV, 30, 1895, (C. H. T. Townsend), 4 ♂, [U. S. N. M.].

Kerrville, Tex., IV, 11, 1907, (F. C. Pratt; at light), 5 ♂, [U. S. N. M. and Hebard Cln.].

San Antonio, Tex., IX, 18 to 27, (E. Palmer), 5 ♂, 2 ♀, [M. C. Z. and Hebard Cln.].

Cotulla, Tex., IV, 18, 1906, (F. C. Pratt), 1 juv. ♀; V, 12, 1906, (Crawford and Pratt), 2 ♂, [all U. S. N. M.].

Esperanza Ranch, Brownsville, Tex., V, 22 and VI, 19, (C. Schaeffer), 2 ♂, [A. N. S. P. and Hebard Cln.].

Sabinal, Tex., V to VI, 19, 1910, (Pratt and Pierce), 3 ♂, 4 ♀, 2 juv. ♂, 2 juv. ♀, [U. S. N. M. and Hebard Cln.].

Knippa, Tex., VII, 3, 1910, (F. C. Pratt), 1 juv. ♂, [U. S. N. M.].

Carrizo Springs, Tex., (A. Wadgymar), 9 ♂, 6 ♀, 4 juv. ♂, 8 juv. ♀, [Hebard Cln., U. S. N. M. and A. N. S. P.].

Ringgold Barracks, [near Rio Grande], Tex., (Schott), 1 ♂, [M. C. Z.].

Devils River, Tex., V, 4, 1907, (F. C. Pratt), 1 juv. ♂, [U. S. N. M.].

Hackberry Creek, Boquillas Road, Brewster County, Tex., IX, 2, 1912, (Rehn and Hebard; attracted to camp fire during two hours), 3 ♂, [Hebard Cln. and A. N. S. P.].

Chisos Mountains, VI, 10 to 12, 1908, (Mitchell and Cushman), 1 ♀, 1 juv. ♀, [U. S. N. M.]; VII, 16, 1911, (H. A. Wenzel), 2 ♂, [A. N. S. P.].

El Paso, Tex., IV, 4, 1899, (H. Solton), 1 juv. ♂; VIII, (G. W. Dunn), 1 ♂, [all Hebard Cln.].

Durango, Colorado, (E. J. Oslar), 1 ♂, [U. S. N. M.].

Mescalero Apache Reservation, New Mexico, X, 2, 1896, (T. D. A. Cockerell), 1 juv. ♂, [M. C. Z.].

[362] Incorrectly recorded by Rehn as *bolliana*. Proc. Acad. Nat. Sci. Phila., 1903, p. 187, (1903).

[363] Incorrectly recorded by Rehn as *bolliana*. Trans. Am. Ent. Soc. xxvii, p. 331, (1902). Proc. Acad. Nat. Sci. Phila., 1903, p. 187, (1903).

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Highrolls, Sacramento Mountains, N. M., VI, 23, 1902, (H. L. Viereck), 1 juv. ♂[364], [A. N. S. P.].

Jemez Hot Springs, N. M., VII, 29 to IX, 2, 1913 and 1915, (J. Woodgate), 3 ♂, [Hebard Cln.].

Albuquerque, N. M., V, 1905, (W. M. Wheeler), 1 ♀, [M. C. Z.]; (H. Wickham). 1 juv. ♀, [U. S. N. M.].

Las Cruces, N. M., IX, 1895, (T. D. A. Cockerell; at light[365]), 4 ♂, [M. C. Z. and Hebard Cln.].

Deming, N. M., VII, 18 to 20, 1907, (Rehn and Hebard; at light), 11 ♂, [Hebard Cln.].

Sheridan Canyon, Hachita Grande Mountains, N. M., (H. A. Pilsbry), 1 ♂, [A. N. S. P.].

Adamana, Arizona, VII, 22, 1907, (Miss Stella McSaws), 1 ♀, [Hebard Cln.].

Winslow, Ariz., (H. Wickham), 1 juv. ♂, [Hebard Cln.].

Fort Grant, Graham County, Ariz., 1882, 3 ♂, [U. S. N. M. and Hebard Cln.].

San Simon, Ariz., V, 7, (H. G. Hubbard), 1 ♂, [U. S. N. M.].

Paradise, Ariz., VIII, 10, 1915, (O. C. Poling), 2 ♂, [Hebard Cln.].

Chiricahua Mountains, Ariz., 1 ♀, 1 juv. ♀, [A. N. S. P.].

Roosevelt, Ariz., 2 ♂, [Cornell Univ. and Hebard Cln.].

Redington, Ariz., 1 ♂, [U. S. N. M.].

Lowell Ranger Station, Pima County, Ariz., VII, 6 and 20, 1916, (Lutz and Rehn), 5 ♂, [A. M. N. H. and A. N. S. P.].

Sabino Basin, Santa Catalina Mountains, Arizona, VIII, 15 to 21, 1916, (Lutz), 3 ♂, 1 ♀, [A. M. N. H. and A. N. S. P.].

Sabino Canyon, Santa Catalina Mountains, Ariz., II, 22 to III, 15, 1916, (J. F. Tucker), 6 ♀, 44 juv.; VI, 5 to XI, 2, 1915 and 1916, (J. F. Tucker), 4 ♂ [all Hebard Cln.].

Tucson, Ariz., (H. Wickham), 1 ♀, [Hebard Cln.]; VII, 21 to 23, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

San Xavier, near Tucson, Ariz., VII, 24, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.].

Snyder's Hill, Pima County, Ariz., c. 2500 feet, X, 11, 1910, (Rehn and Hebard; attracted to camp fire), 1 ♂, [Hebard Cln.].

Roebles Ranch, Pima County, Ariz., VIII, 13, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.]; X, 5, 1910, (Rehn and Hebard; attracted to camp fire), 3 ♂, [Hebard Cln. and A. N. S. P.].

Palo Alto Ranch, Pima County, Ariz., VII, 29 and 30, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

Coyote Mountains, Ariz., VIII, 4 to 7, 1916, (Lutz and Rehn), 1 ♀, [A. M. N. H.].

[364] Incorrectly recorded and described by Rehn as immature *subdiaphana*. Proc. Acad. Nat. Sci. Phila., 1903, pp. 190 to 191, (1903).

[365] One specimen incorrectly recorded by Scudder and Cockerell as *bolliana*. Proc. Davenport Acad. Sci., ix, p. 19, (1901).

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Kits Peak Rincon, Baboquivari Mountains, Ariz., VIII, 7 to 9, 1916, (Lutz and Rehn), 2 ♂, [A. M. N. H. and A. N. S. P.].

Santa Cruz Village, Comobabi Mountains, Ariz., VIII, 10 to 12, 1916, (Lutz and Rehn), 1 ♂, [A. M. N. H.].

Prescott, Ariz., VI, 10, 1902, (E. J. Oslar), 2 ♂, *type*, *paratype*, [A. N. S. P.].

Florence, Ariz., VI, 8, 1903, (C. R. Biederman), 1 juv. ♂; VII, 17 to 22, 1903, (C. R. Biederman), 11 ♂, [A. N. S. P.].

Phoenix, Ariz., VI, 17, 1892, (A. B. Cordley), 1 ♂; VIII, 1890, 1 juv. ♂; IX, 14 to X, 9, 1903 and 1904, (R. E. Kunzé), 7 ♂, [Hebard Cln. and A. N. S. P.].

Fort Mojave, Ariz., III, 25, 1911, 1 ♂, [Hebard Cln.].

Yuma, Ariz., VII, 27, 1907, (Rehn and Hebard; at light), 1 ♂. [Hebard Cln.].

St. George, Utah, 1875, (E. Palmer), 4 ♀, 1 juv. ♂, 1 juv. ♀, [M. C. Z. and Hebard Cln.].

Cottonwood, California, 2274 feet, IX, 9, 1907, (Hebard; at light on train), 1 ♂, [Hebard Cln.].

Riverside, Cal., (H. Wickham), 1 ♀, [Hebard Cln.].

Sonora, Mexico, 1 ♂, [Hebard Cln.].

Arenivaga apacha (Saussure) (Plate IX, figures 14 to 16.)

1893. [*Homoeogamia*] *apacha* Saussure, Rev. Suisse Zool., i, fasc. 2, p. 296. [♂; Chihuahua, Mexico.]

1905. [*Homoeogamia*] *apacha infuscata* Caudell, Proc. U. S. Nat. Mus., xxviii, pp. 462 to 463. [♂; Phoenix, Arizona.]

Comparison of this species with its nearest ally, *A. erratica*, is made under that species.

Normally the shield-shaped dark blotch of the pronotum in males of this species is sharply defined, with darker markings decided, strongly pictured; however, very great color variation is shown, specimens of maximum recession being paler than the normal condition of *erratica*, with shield-shaped blotch greatly reduced and no darker markings. A number of specimens of the maximum intensive coloration have all but the cephalic margin of the pronotum very dark brown, the tegmina, excepting the pale marginal field, being of the same shade, with a few dots of the paler color. This condition has been named *infuscata;* as it merely indicates a certain degree of color variation, we place the name in synonymy.

In addition to the characters given in the key, the following features are of diagnostic value in the male. Though the width between the eyes is normally subequal to that between the ocelli, several specimens before us have this dimension appreciably less. Concealed genital hook and dextro-dorsal genital plate as in *errat-*

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ica. The dextro-ventral concealed genital plate is a smooth, somewhat convex, chitinous plate, from the inner side of which springs a long, heavy, chitinous spike, directed toward the inner extremity of the dextro-dorsal plate.

The female of *apacha*, described by Saussure and Zehntner[366] as possibly immature, was in all probability adult. This sex of the present species is very similar to females of *erratica*. The dorsal surface is somewhat more hairy, with margin, particularly in cephalic portion, bearing more and longer hairs. The limbs are shorter and stouter, this particularly apparent in the tibiae. The abdominal segments are unicolorous above and below, no trace of spots being found as is frequent in *erratica*. It would be ill-advised in our opinion, however, to attempt to determine unique females of the species without attendant males, unless the student has a first-hand knowledge of this sex of both *apacha* and *erratica*.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Phoenix, Arizona.....	(7)	10.5–12.1	3.6–4.2	5–6	13.1–16.8	5.1–6.4
Fort Grant, Arizona....	(2)	11–14.9	3.8–4.1	4.8–6	13.3–17.7	5.1–6.1
Kern County, California		15	4.4	6.2	17	6.5
Strawberry Valley, California.....		16.3	4.9	6.6	17	6.7
San Diego, California...		10.9	3.5	4.7	14.1	5
♀					Width of mesonotum	Width of metanotum
Ehrenberg, Arizona....		12.8	5.1	7.1	8.8	9.4
Fresno County, California.....		13	5.3	7.8	10	10.7
Death Valley, California		12.9	5.3	8.1	9.3	9.9
Palm Springs, California		14.6	6	9	10.7	11.3
Sonoita, Sonora, Mexico.		12.8	6.1	9	10.8	11.1

The length of the caudal tibia in this series of females ranges from 4 to 4.6 mm.

Coloration.—♂. (Maximum recessive.) General coloration light ochraceous-buff. Head with eyes and face blackish brown; ocelli weakly zinc orange; clypeus, including the prominent bilobate portion, light ochraceous-buff. Limbs and ventral surface ochraceous-buff. Pronotum light ochraceous-buff, disk ochraceous-buff, with a picturing of tawny. Tegmina transparent, faintly

[366] Biol. Cent.-Amer., Orth., i, p. 108, (1894).

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tinged with light ochraceous-buff. Wings transparent, clear, with a narrow, opaque, buffy area meso-distad on the costal margin. (Maximum intensive.) Head with eyes and face blackish brown; ocelli, clypeus, limbs and ventral surface light ochraceous-buff. Pronotum blackish chestnut brown, except for a broad band of light ochraceous-buff, which extends along the cephalic margin to, and including, the latero-caudal angles. Tegmina transparent, heavily suffused with blackish chestnut brown, which shows small, irregular, almost colorless blotches, excepting marginal fields, which are light ochraceous-buff. Wings transparent, suffused with blackish chestnut brown, showing in anterior field blotches similar to those of the tegmina. Every gradation between these extremes is shown by the material before us. In the frequent examples showing a color condition about intermediate between the extremes, the pronotal picturing is, in the present species, usually sharply defined in dark brown. The wings frequently have a narrow brown line running across the mesal portion of the anterior and posterior fields, this line is sometimes tawny. The posterior field of the wings is weakly iridescent, sometimes decidedly so.

♀. Dorsal surface immaculate russet, slightly paler toward the cephalic margin of the pronotum. Hairy covering coppery. Head, ventral surface, coxae and femora weak ochraceous-tawny. Tibiae and tarsi darker, with spines deep mars brown. Ventral surface of abdomen russet.

This species has been recorded from Nogales, Arizona, in addition to the localities given below.

Specimens Examined: 78; 56 males, 6 females and 16 immature individuals.

Fort Grant, Graham County, Arizona, 1 ♂, [Hebard Cln.].

Huachuca, Ariz., (R. E. Kunzé), 1 ♂, [Hebard Cln.].

Oracle, Ariz., VII, 10 to 23, 2 ♂, [U. S. N. M. and Hebard Cln.].

Catalina Springs, Ariz., VII, 4, 1 ♂, [U. S. N. M.].

Lowell Ranger Station, Pima County, Ariz., 2550 feet, VII, 6 and 20, 1916, (Lutz and Rehn), 4♂, [A. M. N. H. and A. N. S. P.].

Sabino Canyon, Santa Catalina Mountains, Ariz., II, 25 to XI, 2, 1915 and 1916, (J. F. Tucker), 4 ♂, 4 juv., [Hebard Cln.].

Tucson, Ariz., XII, 23, 1896, (H. G. Hubbard; from nest of wood rat, *Neotoma* sp.), 1 ♀, [U. S. N. M.].

Santa Rita Mountains, Ariz., VI, 15 to VII, 7, (E. A. Schwarz), 4 ♂, [U. S. N. M. and Hebard Cln.].

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Coyote Mountains, Ariz., VIII, 4 to 7, 1916, (Lutz and Rehn), 2 juv., [A. M. N. H. and A. N. S. P.].

Kits Peak Rincon, Baboquivari Mountains, Ariz., about 4050 feet, VIII, 1 to 4, 1916, (Lutz and Rehn), 6 ♂, [A. M. N. H. and A. N. S. P.].

Sycamore Canyon, Baboquivari Mountains, Ariz., c. 3700 feet, X, 6 to 9, 1910, (Rehn and Hebard; attracted to camp fire), 1 ♂, [Hebard Cln.].

Phoenix, Ariz., IV, 9 to 29, 1902, (Oslar; Kunzé), 3 ♂, [A. N. S. P.]; VI, 7 to VII, 1, 1904, (R. E. Kunzé), 3 ♂, [Hebard Cln.]; VII, 16 to 18, (H. Wickham) 1 ♂, [Hebard Cln.].

Tempe, Ariz., IV, 26, 1902, (E. J. Oslar), 1 ♂, [A. N. S. P.].

Florence, Ariz., VI, 8 to VII, 21, 1903, (C. R. Biederman), 12 ♂, 1 juv. ♀, [A. N. S. P. and Hebard Cln.].

Ehrenberg, Ariz., (E. Palmer), 2 ♂, 1 ♀, [M. C. Z. and Hebard Cln.].

Yuma, California, (H. Wickham), 1 ♂, [Hebard Cln.].

Death Valley, Cal., IV, 1891, (A. Koebele), 1 ♀, [Hebard Cln.].

Fresno County, Cal., (A. E. Bush; in moist ground), 1 ♀, [U. S. N. M.].

Monterey, Cal., VII, 12, (E. A. Schwarz), 1 juv. ♀, [U. S. N. M.].

Kern County, Cal., V, 1 ♂, [Hebard Cln.].

Lancaster, Cal., VIII, 10, (H. Wickham), 1 ♀, [Hebard Cln.].

Mount Wilson, Los Angeles County, Cal., VIII, 10, 1909, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

Claremont, Cal., 1 ♂, [U. S. N. M.].

Salton, Cal., −265 feet, VIII, 20, (H. Wickham), 2 juv. ♂, 4 juv. ♀, [U. S. N. M. and Hebard Cln.].

Palm Springs, Cal., II, 7, (H. G. Hubbard), 1 juv. ♀, [U. S. N. M.]; III, 19, (Hubbard and Schwarz), 1 ♀, [Hebard Cln.].

Strawberry Valley, San Jacinto Mountains, Cal., III, 4, 1910, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

San Diego, Cal., (G. R. Crotch), 1 ♂, [Hebard Cln.].

La Sierra de San Francisco, Sonoita, Sonora, Mexico, 1 ♀, 1 juv. ♀, [M. C. Z. and Hebard Cln.].

EREMOBLATTA Rehn

1903. *Eremoblatta* Rehn, Proc. Acad. Nat. Sci. Phila., 1903, p. 181.
1913. *Eremoblatta* Caudell, Proc. U. S. Nat. Mus., xliv, p. 605.

GENOTYPE, by monotypy: *Eremoblatta subdiaphana* [*Homoeogamia subdiaphana*] (Scudder).

This genus differs from *Homoeogamia* and *Arenivaga* in the entirely unarmed femoral extremities; the eight, instead of nine, spines of the cephalic tibiae; the seven, instead of six, apical spines of the median and caudal tibiae, and the decidedly more hairy covering (this latter feature being distinctly more pronounced in the female); in the male, the tegmina are distinctly glossy, the

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supra-anal plate is not decidedly produced, the genital hook is curved outward and the subgenital plate is extraordinarily specialized; in the female, the tarsal joints of the caudal limbs scarcely reach beyond the apices of the distal caudal tibial spines.

The species of this genus are small. Both sexes are more hirsute than in *Arenivaga* and, as in that genus, the apterous females show this feature to a decidedly greater degree than the males.

Eremoblatta subdiaphana (Scudder) (Plate IX, figures 17 to 20.)

1902. *Homoeogamia subdiaphana* Scudder, Proc. Davenport Acad. Sci., ix, p. 19. [♂; Las Cruces, New Mexico.]

1909. *Homoeogamia subdiaphana mohavensis* Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1909, p. 415. [♂; Cottonwood, California.]

This insect, by the numerous generic characters given above, may be readily separated from the species of *Arenivaga*. In addition, the decidedly glassy tegmina, which even in specimens of the maximum intensive coloration are never maculate, and the less oblique discoidal sectors, give males of the present species a distinctive appearance when compared with any other species of the subfamily here considered.

The maximum of recessive coloration is found in material of this species from the Gila-Mojave Desert region; and as the name *mohavensis* was proposed for this condition, we consistently place it in the synonymy here.

The following features are observed in the male sex.

(Alamogordo, New Mexico.) Interocular width slightly greater than that between the ocelli, rarely these dimensions are subequal. Ocelli decidedly produced, with face below these very deeply concave. Pronotum transverse, with cephalic margin broadly, and caudal margin weakly, convex. Tegmina with a decided glassy luster. Discoidal sectors of tegmina weakly oblique. Supra-anal plate transverse, deplanate and weakly produced between the cerci, with distal margin weakly convex. Immediately above the cerci, on each side, a narrow, transverse portion of this plate is convex and thickly covered with hairs. Cerci short, not articulate, proximal half stout; distal half abruptly narrower, directed at an angle to the proximal portion, more delicate in structure and irregularly rounded. Concealed genital hook elongate, base soft, becoming gradually corneous, proximal portion tubular, straight, curving slightly inward distad; distal portion flattened, tubular, curving regularly and sharply outward, not enlarged, with sharp apex directed proximad. From the base of this organ another soft integument is produced inward, becoming corneous distad, in the form of an elongate, sharp spike, which organ is of nearly equal length to the genital hook. Dextro-dorsal concealed genital plate small,

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weakly creased mesad, suggesting bilobation. Dextro-ventral concealed genital plate a large, convex, corneous plate, with distal margin briefly flattened, convex in outline. Subgenital plate produced, asymmetrical, quite deeply arcuato-emarginate latero-mesad, sinistral production rectangulate and sharply rounded, dextral production acute and sharply rounded, projecting slightly more distad. Distal surface of plate armed with minute, scattered, short, sharp spines, directed cephalad. Proximad the surface of the plate, near the sinistral margin, forms a convex ridge, produced cephalad over the preceding segment with margin rounded, this area covered thickly with minute, short, sharp spines, directed cephalad; from beneath this projection a similar development is continued on the preceding segment, bearing a distal fringe of slightly stouter spines. Femora wholly unarmed, clothed, particularly along the ventral margins, with very fine, long hairs.

As the female was hitherto unknown, we here describe a topotypic female before us.

♀; Las Cruces, Donna Ana County, New Mexico. (T. D. A. Cockerell.) [Museum of Comparative Zoology.]

Description of Female.—Very unlike male, apterous, size larger, form subor bicular Eyes even more decidedly reduced than in females of the genus *Arenivaga*, not extending over the antennal sockets. Head with clypeal swelling extending from the very narrow, flattened, distal margin of clypeus to a line drawn across the face just above the antennal bases. Dorsal surface finely punctulate, heavily clothed with hairs, these longest on the margins, particularly latero-caudad (in greatest length 1.7 mm.). Pronotum weakly transverse, cephalic margin arcuate, nearly forming a semicircle, caudal margin very weakly convex produced mesad, with sides broadly but weakly concave. Supra-anal plate strongly transverse, trapeziform, with distal angles rounded. Subgenital plate rather large, weakly produced mesad, with distal margin convex. Cephalic femora with ventro-cephalic margin bearing a few stout, very short, rather closely placed teeth proximad, succeeded in distal two-thirds by a weakly arcuate row of very widely spaced, stout, very short, knob-like spines; other ventral femoral margins frequently supplied with a very few scattered, even smaller but similar, blunt, knob-like spines; all femora very hairy.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Alamogordo, New Mexico	(8)	10.1–11.8	3.2–3.6	4.5–4.9	13.7–15.2	5.1–5.8
Sentinel, Arizona	(5)	9.3–10.8	3.1–3.6	4–5.1	13.2–14.7	5–5.9
Yuma, Arizona	(2)	9–9.5	2.9–3.1	4.1–4.4	11.8–12.2	4.7–4.9
Brown, California		12.3	3.7	4.8	14.9	5.7
Cottonwood, California	(3)	9.2–11.4	3–3.1	4.1–4.2	12.2–14.8	4.6–5.8
Palm Springs, California		10.7	3.6	4.7	14.1	5.8

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♀		Length of body	Length of pronotum	Width of pronotum	Length of mesonotum	Length of metanotum
Las Cruces, New Mexico.						
Described specimen..		9.7	4.3	5.3	7	7.3
Mesilla Park, New Mexico.....	(2)	8.7–11	4.2–5	5.3–6	6.9–7.1	7–8

As in the species of *Arenivaga*, the size variation in this insect appears to be wholly attributable to local environmental factors.

Coloration.—♂. In the maximum intensive type of coloration the pronotum has the cephalic margin pale, this narrowest in the brief mesal portion, on each side of which an invasion into the dark brown of the remaining portion of the pronotum is weakly indicated. In one of the darkest specimens before us, the pronotum has two large latero-caudal blotches of vinaceous rufous. In such dark material, the tegmina and wings are also darkened, but not maculate, nor is their transparency lessened. The material before us shows varied gradations from this type to the maximum of recessive coloration, in which the entire insect is light buff, the pronotum clouded latero-caudad with ochraceous-buff.

♀. Mars brown or russet above, heavily clothed with ochraceous-buff hairs.

The insect is apparently to be found in its greatest abundance in the extreme desert condition of the Southwest. Dr. Wheeler found males flying across the desert in small swarms on March 10, 1911, at Yuma, Arizona; all of the material seen by us was likewise of the male sex, attracted to lights at night.

Specimens Examined: 29; 25 males and 4 females.

Albuquerque, New Mexico, VI, 22 and VIII, 7, 1912, (Merrill), 1 ♂, 1 ♀, [Somes Cln.].

Las Cruces, N. M., (T. D. A. Cockerell; at light), 1 ♂, *type;* (T. D. A. Cockerell), 1 ♀, [both M. C. Z.].

Alamogordo, N. M., IV, 11 to VI, 6, 1902, (Rehn and Viereck; majority at light), 8 ♂, [A. N. S. P. and Hebard Cln.].

Mesilla Park, N. M., I, 1900, (C. Thompson), 1 ♀, [U. S. N. M.]; (C. N. Ainslie), 1 ♀, [Hebard Cln.].

Las Vegas, Nevada, 2050 feet, VIII, 9, 1907, (Hebard; at light), 2 ♂, [Hebard Cln.].

Maricopa Divide, Maricopa County, Arizona, X, 2, 1910, (Hebard; attracted to light on train), 2 ♂, [Hebard Cln.].

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Sentinel, Ariz., X, 2, 1910, (Rehn and Hebard; attracted to station lamp), 5 ♂, [Hebard Cln. and A. N. S. P.].

Yuma, Ariz., III, 10, 1911, (W. M. Wheeler; ant guest), 1 ♂, [A. N. S. P.].

Brown, Kern County, California, X, 5, 1909, (F. Grinnell Jr.), 1 ♂, [A. N. S. P.].

Cottonwood, San Bernardino County, Cal., 2274 feet, IX, 9, 1907, (Hebard; attracted to light on train), 3 ♂, [Hebard Cln. and A. N. S. P.].

Palm Springs, Cal., 450 feet, IX, 29, 1910, (Hebard; attracted to light), 1 ♂, [Hebard Cln.].

Eremoblatta hirsuta new species (Plate IX, figures 21 and 22.)

Closely related to *E. subdiaphana;* readily separated by the proportionately deeper pronotum and heavier clothing of hair in both sexes, a male genital character and tegmina moderately glassy, with discoidal sectors longitudinal in that sex, and by the narrower clypeal swelling in the female. The male also appears to have the eyes wider apart and the face more deeply cleft between and below the ocelli, but these features can not be exactly determined, as some distortion has taken place from immersion in alcohol.

Type.— ♂; Sierra El Tosti, Lower California, Mexico. October, 1893. [Hebard Collection Type no. 409.]

Description of Type.—Size relatively very small, form acute elliptical. Head with width between eyes decidedly greater than that between the ocelli, which latter are very large and prominent, with face between and below these very deeply cleft. Pronotum very deep, proportionately much less transverse than in *subdiaphana*, cephalic margin roundly angulate mesad at slightly less than 90°, caudal margin weakly convex, surface of pronotum covered with minute hairs, cephalic margin more thickly clothed with much longer hairs (in greatest length 1.2 mm.). Tegmina less elongate than in *subdiaphana*, discoidal sectors longitudinal, parallel to both costal and sutural margins, proximal surface of tegmina supplied with scattered, minute hairs. The genitalia are of the peculiar and complex nature of *subdiaphana*, differing only in the appendage situated beside the concealed genital hook, which is of different shape—proximad broad and subchitinous, distad produced in a brief, chitinous spine, less than half as long as is this projection in *subdiaphana*.

Allotype.— ♀; San José del Cabo, Lower California, Mexico. [Hebard Collection.]

Description of Allotype.—Very similar to this sex of *subdiaphana*. Clypeal swelling narrower, extending from the slightly broader, flattened, distal margin of the clypeus to a line drawn across just below the antennal bases. Pronotum proportionately

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deeper, hairs heavier and longer (greatest length 2 mm., fringing abdomen latero-caudad). Supra-anal and subgenital plates as in *subdiaphana*.

In addition to the type and allotype, two females from San José del Cabo, may be considered paratypes.

Measurements (in millimeters)

	Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen	Width of mesonotum	Width of metanotum
Sierra El Tosti, Lower California, *type*, ♂	9	3.3	4	9.6	3.4	—	—
San José del Cabo, Lower California, *allotype*, ♀	11.6	5.7	6.7	—	—	7.8	8.7
San José del Cabo, Lower California, *paratype*, ♀	10	5	5.8	—	—	7	7.8
San José del Cabo, Lower California, *paratype*, ♀	9.6	4.7	5.1	—	—	6	6.7

Coloration.—♂. Entirely shining fuscous black, excepting a brief, narrow, cream buff marking on the pronotum on each side of the cephalic angle, these markings with inner margin convex. Hairy covering golden, giving this insect a remarkable sheen in certain lights. Tegmina transparent, heavily suffused, particularly proximad. Wings transparent, moderately suffused; distal portion of posterior field strongly iridescent.

♀. Bister above, thickly covered with even more striking golden hairs. Limbs clay color, becoming darker distad toward the heavy mahogany colored spines.

Specimens Examined: 13; 1 male, 5 females, 2 immature males and 5 immature females.

Sierra El Tosti, Lower California, Mexico, X, 1893, 1 ♂, *type*, [Hebard Cln.]. (Dried alcoholic.)

Comondu, L. Cal., Mex., III, 1889, (C. D. Haines), 1 juv. ♀, [Hebard Cln.].

San José del Cabo, L. Cal., Mex., 3 ♀, *allotype*, *paratypes*, 2 juv. ♂, 1 juv. ♀, [Hebard Cln. and A. N. S. P.].

Cape San Lucas, L. Cal., Mex., 2 ♀, *paratypes*, 3 juv. ♀, [M. C. Z. and Hebard Cln.].

Subfamily OXYHALOINAE

The present subfamily is separated into three divisions; each of which have been given subfamily rank by Kirby, as the Choriso-

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neurinae, Oxyhaloinae and Plectopterinae. At the present time we do not feel justified in recognizing these, the character of the folding of the distal portion of the wings being the most important factor available for their separation, which, in itself, does not appear to warrant such action.[367]

Of the subfamily showing few or no spines on the ventral femoral margins, the Oxyhaloinae are readily separable from the preceding two, the Corydiinae and Polyphaginae, by having the wings, when present, with anal area folding fanwise, in this respect agreeing with the Panchlorinae and Blaberinae, in which subfamilies the wings are found to have the ulnar vein with numerous incomplete rami and an intercalated area subobsolete or absent.

The forms of the Oxyhaloinae never develop the very heavily chitinous and robust condition typical of the two succeeding subfamilies, the Perisphaerinae and Panesthinae.

The following features are considered diagnostic. Head broad, ocelli indicated by spots or wholly absent. Pronotum and tegmina without hairs. Tegmina with venation distinct; with, or without,[368] strongly developed intercalated triangle,[369] or appendicular field.[370] Subgenital plate of females simple, or with a medio-longitudinal, linear cleft distad. Limbs, excluding ventro-caudal margins of caudal femora, which are entirely unarmed, with ventral margins unarmed except for single distal spines.[371] Median and caudal femora with a dorsal genicular spine. Tarsi with first four joints,[372] or fourth joint alone,[373] supplied with a large pulvillus. Large arolia present.

[367] The wings are developed as follows. The genus *Oxyhaloa* shows no distal field, while the evidently allied *Diploptera* shows a greatly developed, reflexed, appendicular field. The genus *Chorisoneura* and its allies show a decided, reflexed, intercalated triangle, in some approaching an appendicular field. The genus *Plectoptera* and its allies show a reflexed, appendicular field.

[368] *Oxyhaloa* and allies.

[369] *Chorisoneura* and allies.

[370] *Diploptera* and *Plectoptera*.

[371] In a single apparently abnormal specimen of *Chorisoneura* before us, the ventro-cephalic margins of the cephalic femora have each two distal spines.

[372] *Oxyhaloa*, *Diploptera*.

[373] *Hypnorna*, *Chorisoneura*, *Plectoptera*.

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CHORISONEURA Brunner

1865. *Chorisoneura* Brunner, Nouv. Syst. Blatt., p. 255.

Five species were originally included in the genus, one of these since proven a synonym of an older name. In addition to these, a large number of species have been subsequently described. The genus is apparently peculiar to America.

GENOTYPE: *Chorisoneura nigrifrons* [*Blatta nigrifrons*] (Serville), selected by Rehn, in 1903.[374]

Generic Description.—Head triangular, with angles rounded; eyes widely separated; ocellar areas not defined; ocellar spots absent; small but distinct rounded areas, with surface convex, are found meso-ventrad of antennal sockets; face decidedly flattened, weakly convex. Pronotum broad; disk with very weak impressions; lateral portions broad and scarcely declivent; lateral margins broadly convex; caudal margin truncate, nearly transverse. Tegmina delicate and narrow, tapering distad to the sharply rounded apex; veins distinct; discoidal sectors oblique. Wings with numerous costal veins, of which part are clavate distad; numerous transverse veinlets between discoidal and median veins; ulnar vein undivided, or with a single distal fork; intercalated triangle large and striking, in many species best termed an appendicular field. Sixth dorsal abdominal segment of male specialized mesad. Subgenital plate of male with styles situated mesad and produced in elongate scutes. Subgenital plate of female with a medio-longitudinal, linear cleft distad. Cephalic femora with ventro-cephalic margin supplied with a fringe of hairs, which are shorter and more closely set meso-distad,[375] terminating in a single elongate distal spine;[376] ventro-caudal margin unarmed. Median and caudal femora with ventral margins each supplied with a single elongate distal spine. Tarsi elongate, fourth tarsal joint alone supplied with a pulvillus, which is large, completely filling the brief ventral surface of this joint and roundly produced beyond. Large arolia present.

[374] Trans. Am. Ent. Soc., xxix, p. 280.

[375] These might well be termed chaetiform spines.

[376] A single exotic example of the genus before us is apparently abnormal; in this individual the ventro-cephalic margins of the cephalic femora have each two distal spines.

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Chorisoneura texensis Saussure and Zehntner (Plate X, figures 7 and 8.)

1893. *Chorisoneura texensis* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 80. [♂: New Mexico;[377] Texas.]

1904. *Chorisoneura plocea* Rehn, Ent. News, xv, p. 184. [♀, Coast of South Carolina.]

Confusion in the description of the tegminal venation of *plocea*, and the ambiguity in the description of the costal veins of the wing in *texensis*, accounts for the above synonymy. The venation in tegmina and wings in the type of *plocea* agrees fully with the description of *texensis* and with Texan material of the species now, before us.[378]

The obtuse-angulation of the base of the appendicular field of the wings distinguishes this insect, from all the other species of the genus we have been able to examine.

Characters of Male.—(Esperan za Ranch, Brownsville, Texas.) Size medium small form moderately broad for the genus. Head immaculate in coloration; width about equal to length; interocular space slightly narrower than the broad space between the antennal sockets. Pronotum subelliptical, with caudal margin (usually) almost transverse, very weakly convex. Tegmina with margins distad convergent and moderately convex to apex; discoidal sectors (10 to 13 in series) rather strongly oblique, the great majority springing from the median vein. Wings with numerous (10 to 13 in series) costal veins, of which the more proximal (6 to 8 in series) are heavily clavate distad; discoidal and median vein connected by (6 to 8 in series) transverse veinlets; ulnar vein unbranched; axillary vein with two branches, these run to near the caudal angle of the appendicular field; appendicular field with base forming an angle of slightly more than 90°, width of field slightly greater than length. Sixth dorsal abdominal segment with a rounded meso-cephalic area, thickly supplied with agglutinated hairs, which lie flat and are directed caudad.[379] Supra-anal plate strongly transverse, caudal margin weakly convex. Cerci elongate fusiform, depressed (usually composed of nine joints). Subgenital plate small, with distal margin briefly concave to two slender, adjacent, mesal scutes (styles) which, converging, become contiguous distad; between the bases of these is a small, slender, chitinous projection, closely pressed between the much longer scutes, which project dorsad to the apex of the supra-anal plate. Armament of limbs, pulvilli and arolia, as given in generic description.

[377] This New Mexican record suggests an error of some kind; the species has not been found, and, in our opinion, does not occur, in truly desert regions, nor has it ever been taken in the mountainous regions of the southwestern United States.

[378] The synonymy of *plocea* with *texensis* has been established by Rehn and Hebard, Proc. Acad. Nat. Sci. Phila., 1916, p. 120, (1916).

[379] This area is inconspicuous and might easily be overlooked in the present species.

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Characters of Female.—(Esperanza Ranch, Brownsville, Texas.) Very similar to male, differing in the following features. Dorsal surface of abdomen unspecialized. Supra-anal plate transverse, medio-longitudinally sulcate, weakly triangularly produced, with apex incised. Subgenital plate large, distal portion rectangularly produced and with a medio-longitudinal linear cleft to base of triangle thus formed, this produced portion apparently flexible, bent strongly upward in this specimen.[380]

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
St. Simon's Island, Georgia	—	8.3	2.1	3	9.3	2.8
Jacksonville, Florida	—	8.3	2.1	3.1	8.9	2.8
Type. (Ex. S. & Z.)	—	"9.5"	"2.25"	"3.2"	"9"	—
Brownsville, Texas	(6)	7.8–8	1.6–1.8	2.6–2.7	7.2–7.8	2.3–2.4
♀						
Coast of South Carolina	—	8.4	2.2	3.3	8.4	2.9
Atlantic Beach, Florida	—	7.4	1.8	3	7.7	2.9
Key Largo, Florida	—	8.2	2	3	7.6	2.8
Near Waco, Texas	—	8.2	2	3.2	8.6	2.8
Brownsville, Texas	(5)	7.3–7.7	1.7–1.9	2.4–2.7	6.8–7.3	2.4–2.5

The material from Brownsville averages distinctly smaller than that from more northern Texas or from the Atlantic Coast. This is due either to geographic size variation, or local environmental conditions; other differences do not exist in the series. Saussure's Texan specimen, type of *texensis*, came from Boll and, in consequence, very probably from the vicinity of Dallas.

Coloration.—Disk of pronotum, head and abdomen, ochraceous-buff tinged with ochraceous-tawny, to weak ochraceous-tawny. Remaining portions of pronotum, marginal field of tegmina and portion of dextral tegmen, concealed when at rest, transparent, with a weak buffy tinge. Other portions of tegmina transparent, tinged with ochraceous-tawny. Wings hyaline, weakly iridescent, tinged with ochraceous-tawny in area of costal veins and in area of forks of axillary vein, near base of appendicular field. Eyes dark brown. Limbs ochraceous-buff. In one specimen (Marietta, Georgia) the head is pale but the pronotum has the disk narrowly

[380] In such specimens, frequent in the series before us, what would appear to be the distal margin of the plate is broadly transverse mesad, the triangularly projecting portions being concealed within the anal chamber.

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suffused with dark brown laterad.[381] In another specimen (Brownsville, Texas) weak suffusions of darker brown are found on the head between the ocelli and on the genae,[382] and on the pronotum mesad on the disk.

Immature examples before us show two color conditions. In one (Lakeland and Key Largo, Florida), the general coloration is pale ochraceous-tawny, the lateral margins of the pronotum, mesonotum and metanotum transparent, with a weak buffy tinge. In the other (Thomasville, Georgia, and Natchez, Mississippi), the abdomen, and cerci are blackish chestnut brown, this darker coloration extending as narrow, lateral, submarginal, suffused bands to the cephalic margin of the pronotum, bordering the transparent margins and becoming narrower and weaker cephalad. The remaining portions are pale ochraceous-tawny.

Though widely distributed through the southeastern United States, we have never found this insect in numbers, rare individuals having been taken, in the majority of cases, by beating shrubbery.

Specimens Examined: 35; 15 males, 15 females and 5 immature individuals.

Tryon, North Carolina, VI, 19, (at light), 2 ♂, [U. S. N. M.].

Coast of South Carolina, (E. A. Smyth Jr.), 1 ♀, *type* of *C. plocea* Rehn, [Hebard Cln.].

Marietta, Georgia, VI, 7, 1909, 1 ♀, [A. N. S. P.].

St. Simon's Island, Ga., IV, 22 to V, 12, 1911, (J. C. Bradley), 3 ♂, 2 ♀, [Cornell Univ., A. N. S. P. and Hebard Cln.].

Thomasville, Ga., I, 10, 1903, (Hebard; undergrowth in pine woods), 1 juv. ♀, [Hebard Cln.].

Atlantic Beach, Fla., VIII, 25, 1911, (Rehn; beaten from bayberry bushes, *Myrica cerifera*, growing in and along edge of pine woods), 1 ♂, 1 ♀, [Hebard Cln. and A. N. S. P.].

Jacksonville, Fla., (Mrs. A. T. Slosson), 1 ♂, [M. C. Z.].

Orlando, Fla., IV, 14 and 16, 1916, (G. G. Ainslie; at light), 2 ♀, [Fox and Hebard Clns.]; VI, 7, 1907, (in nests of webworm), 1 ♀, [U. S. N. M.].

Lakeland, Fla., (G. G. Ainslie), 1 ♂, [Fox Cln.]; V, 5 and 8, 1912, (W. T. Davis), 1 ♀, 2 juv. ♂, [Davis and Hebard Clns.].

Key Largo, Fla., III, 18, 1910, (Hebard; in depths of jungle, beaten from lower branches of gumbo limbo and other trees and from the lower bushes and shrubs), 1 ♀, 1 juv. ♂, [Hebard Cln.].

[381] This, a decided intensive color condition for the species, is apparently due, in part, to the survival of the dark coloration found in some immature individuals.

[382] The head, however, never shows distinctive markings such as are conspicuous and of specific diagnostic importance in many forms of the genus.

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Natchez, Mississippi, IX, 14, 1915, (Rehn; beaten from low oaks on hills), 1 small juv. ♂,[383] [Hebard Cln.].

Near Waco, Texas, (Belfrage), 1 ♀, [M. C. Z.].

Brownsville, Tex., (C. H. T. Townsend), 1 ♂, [Hebard Cln.]; VI, (F. H. Snow), 1 ♂, [A. N. S. P.]; VII, 1 ♂, [Bklyn. Inst.]; VII, 31, 1912, (Hebard; beaten from tall weeds, in opening in river plain jungle scrub), 1 ♂, [Hebard Cln.].

Esperanza Ranch, near Brownsville, Tex., VII, 30 to VIII, 2, 1904, (C. Schaeffer), 3 ♂, 4 ♀, [Bklyn. Inst., A. N. S. P. and Hebard Cln.].

PLECTOPTERA Saussure

1864. *Plectopera* Saussure, Mém. l'Hist. Nat. Mex., iv, p. 173, figure of wing.[384]

The genus is distinctive and widely separated from those showing nearest relationship. It is clear, however, from the form of the head, specialization of sixth dorsal abdominal segment in male, armament of limbs and presence of a single pulvillus on the fourth tarsal joint alone, that much closer relationship exists to *Chorisoneura* than has been generally supposed.

Two species were originally included in the genus. A number of species are now known, all of which are tropical American in distribution, the majority found in the West Indies.

GENOTYPE: *Plectoptera porcellana* [*Bl*[*atta*] *porcellana*] (Saussure), selected by Rehn, in 1903.[385]

Generic Description.—Form ovoid; dorsal surface convex, smooth and shining, suggesting certain forms of Coleoptera. Head triangular, with angles broadly rounded; eyes widely separated; ocellar areas not defined; ocellar spots absent. Maxillary palpi delicate; third joint much longer than fourth, fifth (distal) joint in length about intermediate between these. Pronotum convex, this strongest laterad; narrowly elliptical, with lateral portions broad; cephalic margin truncate, caudal margin weakly convex. Tegmina decidedly convex, smooth and shining, scarcely extending beyond apex of abdomen; median vein distinct, paralleling discoidal vein, from which latter spring numerous costal veins; oblique discoidal sectors weakly indicated near anal sulcus,[386] obsolete beyond. Wings very elongate; area of costal veins short and wide; a few (normally 4) costal veins, apparent only in certain lights; a

[383] Incorrectly recorded by Hebard as *Cariblatta lutea lutea*.

[384] Saussure's treatment of the genus is full and masterly.

[385] Trans. Am. Ent. Soc., xxix, p. 281.

[386] These veins can be seen only in certain lights.

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number of weak, transverse veinlets run from the discoidal to the weak median vein; ulnar vein as heavy as discoidal vein, undivided almost to base of appendicular field, there connecting along that margin with the discoidal and anal veins; axillary vein similarly connected distad with the anal vein and reaching in the opposite direction nearly to the posterior angle of the appendicular field, axillary vein with two branches, one reaching the posterior angle of the appendicular field, the other reaching the free margin of the posterior field; appendicular field very large and elongate, length slightly less than length of proximal portion of wing, surface coriaceous, basal margin almost straight, lateral margins convex and convergent to the broadly rounded apex. Dorsal surface of male abdomen with sixth segment specialized mesad. Subgenital plate of male with styles situated mesad. Subgenital plate of female truncate distad, without median cleft, but sometimes with a small meso-distal emargination. Armament of limbs, character of tarsi, pulvilli and arolia as in *Chorisoneura*. Tarsal claws very distinctive from the known genera of the Blattidae; each claw very delicate, armed with two microscopic teeth mesad on its internal margin.

Plectoptera floridana new species (Plate X, figures 9 to 12.)

All of the material here considered, with the exception of the first specimen listed, has been recorded by Rehn and Hebard as *Plectoptera poeyi* (Saussure), a distinct but related Cuban species.[387]

The present insect is distinct from the other forms of the genus in the combination of size, head marking, general coloration and character of male subgenital plate.

Type.— ♂; Key West, Florida. January 19, 1904. (M. Hebard.) [Hebard Collection Type no. 434.]

Description of Type.[388]—Size very small, medium for the genus. Head with width about equal to length; interocular space broad, but distinctly less than the very broad space between the antennal sockets, interocular space with a narrow, distinct, dark, transverse band. Pronotum and tegmina immaculate. Wings very delicate, broader than in *P. porcellana*,[389] with veins not conspicuously dark-

[387] A series of fifty-nine West Indian specimens of the genus, representing numerous species, is now before us and enables us to determine these facts.

[388] Many characters are given in the generic description which do not show even slight differences in the species of the present genus.

[389] Of which species, a series of Cuban specimens is before us.

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ened; branches of axillary vein without transverse connecting veinlets; appendicular field ample. Dorsal surface of abdomen with sixth segment showing meso-proximad a very weakly defined, circular area, supplied with minute, microscopic, agglutinated hairs, which lie flat and are directed caudad.[390] Supra-anal plate triangularly produced, length nearly equal to one-half of width; lateral margins convergent and feebly concave to the blunt apex. Cerci simple, flattened; joints weakly defined,[391] distal joints tapering sharply to the acuminate apex. Subgenital plate small; free lateral margins concave-convergent to the median area, which is subquadrate emarginate; the basal margin of this emargination (the meso-distal portion of the free margin of the plate) triangularly produced to an acute apex, with sides feebly convex, this production longer than broad; at the lateral bases of this production are found the slender, flattened, cylindrical (but broadened proximad) styles, which are laterally joined to the lateral portions of the plate, excepting distad, at their rounded apices, which are directed caudo-laterad and are supplied with a few, minute, chitinous spines, these apices project slightly beyond the acute-angulate, sharply rounded apices of the lateral portions of the plate and well beyond the acute apex of the mesal production. The styles are of similar form and equal length. Armament of limbs and character of pulvilli, arolia and tarsal claws as given in generic description.

Allotype.— ♀ ; same data as type. [Hebard Collection.]

Description of Allotype.—Very similar to male, differing in the following characters. Interocular space slightly broader, nearly equal to that between the antennal sockets. Dorsal surface of abdomen unspecialized. Supra-anal plate generally similar, but with apex distinctly emarginate, the projections thus formed broadly rounded; the plate with a medio-longitudinal sulcation feebly suggested. Subgenital plate large and broad, very feebly convex, the very large mesal section subdeplanate; lateral margins briefly and weakly convex, parallel, then rounding into the very broad, transverse distal portion, which laterad, at bases of cerci, is broadly and shallowly, but distinctly, concave, the intervening portion of the distal margin broad, nearly straight, very feebly convex; along this margin the plate curves slightly upward.

Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of tegmen	Width of tegmen
Key West, Florida, *type*		5.4	1.3	2.1	5.1	1.9
Key West, Florida, *paratypes*	(16)	5–5.7	1.3–1.6	2–2.2	4.4–4.8	1.8–1.9
♀						
Key West, Florida, *allotype*		5.5	1.3	2.3	5	1.9
Key West, Florida, *paratypes*	(11)	4.9–5.6	1.3–1.6	2.1–2.4	4.6–5.1	1.9–2

[390] This specialization can be seen only under a powerful lens.

[391] Usually about six in number.

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The males of this species average very slightly smaller than the females, the more projecting subgenital plate, however, gives them an average equal body length.

Coloration.—General coloration ochraceous-buff with a tawny tinge. Head of general coloration, with a narrow, transverse line of prout's brown between the eyes, this line individually varies somewhat in intensity but is always conspicuous. Sometimes this line is margined with a paler coloration than the other portions of the head, ochraceous-buff to warm buff, these margins always weakly defined. Eyes prout's brown. Disk of pronotum varying from ochraceous-buff with a tawny tinge, to ochraceous-tawny; lateral portions of pronotum transparent, with a buffy tinge. Tegmina transparent ochraceous-buff. Wings transparent, in large part weakly iridescent and faintly tinged with ochraceous-tawny, this heavy in area of costal veins and narrowly along basal margin of appendicular field; appendicular field weakly tinged with ochraceous-tawny, with a suffusion of buckthorn brown along the anterior margin. Abdomen and underparts of male ochraceous-tawny. Ventral abdominal segments of female broadly margined laterad with buffy. Subgenital plate of female margined with buffy, broadly laterad, narrowly distad.

Four immature examples from Key West, Florida, beaten from *Ilex cassine*, are weak ochraceous-tawny in general coloration, with paler lateral markings on abdomen distinct in two, weakly defined in two. Two immature males, taken in the leaf mould of the key scrub at the same place, have the dorsal surface of the abdomen dark brown, marked with buffy laterad and meso-distad on the exposed segments, this becoming stronger latero-cephalad. The dark brown coloration is continued in meso-lateral, suffused bands on the metanotum, mesonotum and pronotum, these bands becoming weaker cephalad.

In the single female before us bearing an ootheca, only a sufficient portion is projecting to determine that this capsule is carried with suture dorsad; the suture bearing regularly placed, minute, but well projecting teeth, at wide intervals.

The known distribution of the species is defined by the material listed below.

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Specimens Examined: 38; 17 males, 16 females and 5 immature individuals.

Big Pine Key, Fla., VII, 6, 1912, (Rehn and Hebard; beaten from fringe of tall bushes, on edge of mangrove swamp), 4 ♀, [Hebard Cln. and A. N. S. P.].

Key West, Fla., I, 19, 1904, (Hebard; fairly common, beaten from *Ilex cassine*), 5 ♂, 4 ♀, *type, allotype, paratypes;* III, 15, 1910, (Hebard; rare, beaten from *Ilex cassine*), 1 ♀, *paratype*, 1 juv. ♂; VII, 7, 1912, (Rehn and Hebard; fairly common, beaten from bushes, particularly *Ilex cassine*, 1 immature running about at night on leaves of *Conocarpus erecta*, two immature in leaf mould in key scrub), 12 ♂, 7 ♀, 1 with ootheca, *paratypes*, 2 juv. ♂, 2 juv. ♀, [Hebard Cln., A. N. S. P. and U. S. N. M.].

Subfamily PANESTHINAE

The following features are considered diagnostic. Large robust insects with chitinous surface very heavy, the pronotal surface variously strongly irregular. Eyes not prominent; ocelli, when present in individuals with fully developed organs of flight, small, with convex surfaces. Tegmina fully developed, reduced to various degrees, or absent; when present, heavily chitinous, with anal sulcus alone conspicuous. Wings, when fully developed, exceptionally heavy in structure, with supplementary veins distad between the veins and their branches; mediastine vein extending to near apex of wing; costal veins subobsolete, their area very narrow; discoidal vein with numerous branches; ulnar vein with numerous complete and some incomplete proximal branches; intercalation obsolete.[392] Sixth ventral abdominal segment greatly enlarged in males, entirely hiding subgenital plate;[393] or with narrow distal portion of seventh segment exposed and chitinous, and succeeding segments obsolete.[394] Limbs very heavy and stout. Femora with ventral margins unarmed, except for a distal spine, or two spines; excepting ventro-cephalic margin of cephalic femora, which is armed, in some species, with one to four extremely heavy, elongate, proximal spines, succeeded distad by a series of elongate, chaetiform spines. Heavy pulvilli present on four proximal tarsal joints. Tarsal claws large and heavy, without arolia.

[392] In *Panesthia* and allies.

[393] This segment is called the seventh, by those authors who consider that the median segment represents the first dorsal abdominal segment.

[394] In *Cryptocercus*.

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CRYPTOCERCUS Scudder

1862. *Cryptocercus* Scudder, Bost. Journ. Nat. Hist., vii, p. 419.

Two species of the present genus have been described.[395]

GENOTYPE, by monotypy: *C[ryptocercus] punctulatus* Scudder.

Description of Genus.—Eyes very decidedly reduced, small and convex, roundly trigonal, situated dorso-laterad of the antennal sockets and very little larger than these; no trace of ocellar spots. Pronotum convex, except for a wide and deep medio-longitudinal depression, which begins near the caudal margin and extends to a broad, concave, transverse area near the cephalic margin, which margin is broad and raised above the head in a brief hood; meso-laterad of the median depression, its sides are raised in weakly developed, roughened projections. Tegmina and wings absent. Limbs heavy. Sixth dorsal[396] and ventral abdominal segments produced, completely enveloping the genitalia. Cephalic femora with ventro-cephalic margin unarmed, except at distal extremity, where three,[397] short, stout, equal spines, directed nearly perpendicular to the margin, occur: the ventro-caudal margins of all the femora are (normally) armed each with two similar spines, otherwise all of the ventral femoral margins are smooth. The femora entirely lack dorsal genicular spines. Tarsi short and stout, first four joints each supplied distad with a large rounded pulvillus, these pulvilli extending half the distance to the base of each of the three short joints succeeding the metatarsus. Tarsal claws heavy, arolia absent.

Cryptocercus punctulatus Scudder (Plate X, figures 13 to 16.)

1862. *C[ryptocercus] punctulatus* Scudder, Bost. Journ. Nat. Hist., vii, p. 420.

[[nearly adult] ♂ Draper's Valley, Virginia; ♀ New York; ♀ Pennsylvania.]

We here select as type, the nearly adult male from Draper's Valley, Virginia.

[395] The second species is *Cryptocercus spadicus* Shiraki, described from Gifu, Japan, in 1906 (Annot. Zool. Jap., vi, p. 32, pl. ii, fig. 2). The description and figure afford no specific diagnostic characters. The measurements show the type to be either immature or a much smaller species than *punctulatus*.

[396] This segment is given as the seventh by Scudder, who considered the median segment to be the first dorsal abdominal segment.

[397] Rarely but two spines are found in this position, while in one example before us only a single spine is found there.

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This remarkable insect is distinctive among the species of North American roaches in the peculiar pronotum, which is thickened and somewhat hooded cephalad; in the absence of tegmina and wings, and in the production of the sixth dorsal and ventral abdominal segments, which completely conceal the genitalia in both sexes.

Characters of Male.—(Sulphur Springs, North Carolina.) Head flattened; eyes not projecting, ocelli absent; face polished, with minute, scattered, microscopic punctae. Maxillary palpi very short; fifth (distal) joint slightly longer than third or fourth, with distal truncation not strongly oblique, extending only one-third the distance from apex to base of joint. Pronotum polished, with punctae as on face, roughened along borders of median depression and with numerous minute, rounded projections in depressed area before the cephalic margin. Tegmina and wings absent. Mesonotum, metanotum and dorsal surface of abdomen polished, with minute, scattered, microscopic punctae, these more numerous laterad and on fifth segment, accompanied by a few, minute, rounded projections on fifth segment. Sixth dorsal abdominal segment triangularly produced; surface thickly supplied with minute depressions and minute, rounded, projections; lateral margins cingulate, convergent to the weakly emarginate apex, this brief distal portion of the free margin not cingulate. Supra-anal and subgenital plates and cerci situated within orifice formed by the produced sixth dorsal and ventral abdominal segments. Supra-anal plate not heavily chitinous, with free margins broadly concave laterad at bases of cerci, thence convex convergent, the median portion of the plate strongly produced, shield-shaped. Cerci stout, rather short, covered with minute hairs, tapering distad to acute apex, the lateral margins entire, not crenate; dorsal surface flat, ventral surface convex, joints obsolete. Within the anal chamber, sinistrad, is situated a short, stout, genital hook, bent inward at a right-angle mesad and roughly rounded, with distal portion rather blunt. This genital hook springs from the surface of one of the soft lobes which are found within the anal chamber. Subgenital plate roughly scoop-shaped, produced, disto-laterad briefly and sharply emarginate on both sides, from which emarginations spring small, elongate, cylindrical, similar styles; between these the distal margin is rather strongly convex. Sixth ventral abdominal segment produced to meet the sixth dorsal abdominal segment; distal margin evenly convex; inner surface covered with a soft integument, which shows no medio-longitudinal suture. Limbs, armament of same, pulvilli and arolia as given in generic description.

Characters of Female.—(Sulphur Springs, North Carolina.) This sex is inseparable externally from the male; without removing the sixth ventral abdominal segment, it is sometimes impossible to determine the sex, but in frequent examples the internal surface of the sixth ventral abdominal segment is partially visible. Supra-anal plate concealed as in male, of similar form and structure. Subgenital plate absent. Sixth ventral abdominal segment as in male, except that the soft integument of the inner surface shows a weakly indicated, medio-longitudinal suture.

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Measurements (in millimeters)

♂		Length of body	Length of pronotum	Width of pronotum	Length of caudal femur
Sulphur Springs, North Carolina....	(14)	24–29	7.2–8	9–9.8	5.7–6.2
Glendale, Oregon.....	(3)	24–28	7–7.9	9.1–9.8	5.8–6
♀					
Sulphur Springs, North Carolina...	(20)	23.5–27	7.2–7.9	9–9.9	5.7–6.1
Glendale, Oregon.....	(3)	24–28.5	7.1–7.7	9–9.8	5.7–6.2

Coloration.—General color shining, almost black, showing a paler tinge of claret brown on abdomen and ventral surface (intensive); deep claret brown, darker on pronotum and laterad on mesonotum and metanotum (recessive). Examples which have recently moulted are pale buffy in general coloration, until they begin to harden.

The following notes were made on the material here recorded from Oregon. "Two colonies were found in fir logs, only where the wood was soggy and the bark stripped easily. There, directly under the bark and in the burrowings in the sap wood, the series was taken. Individuals eat their way through the sap wood, preferring the places where it is soft, soggy and decayed." We have frequently observed this species and always under similar conditions, the decaying tree trunks belonging, however, to a variety of species.

The insect is distributed widely through the Appalachian region, from New York state to northern Georgia, and has been recorded westward as far as the Mammoth Cave, Kentucky. On the Pacific coast, it is known from Chehalis, Washington; Glendale, Divide and Cottage Grove, Oregon, and "California."

Specimens Examined: 205; 116 adults and 89 immature individuals.

New York, 1 juv., *paratype*, [M. C. Z.].

Pittsburg, Pennsylvania, 1 juv. ♀, [Pa. State Dept. Zool. Cln.].

Meadow Mountain, Garrett County, Maryland, VIII, 1911, (W. Stone), 3 adults, 2 juv., [A. N. S. P.].

Sounding Knob, Highland County, Virginia, 4400 feet, VIII, 21, 1916, (Hebard; summit forest, in decaying chestnut log), 2 ♂, 4 ♀, [Hebard Cln.].

Hot Springs, Va., 2400 to 2500 feet, VII, 3 to VII, 26, 1916, (Hebard; in decaying chestnut logs and in decaying sap wood of pine logs), 5 ♂, 5 ♀, 9 juv., [Hebard Cln.].

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Collison Ridge, Bath County, Va., 3000 feet, VII, 14, 1916, (Hebard; decaying chestnut log in summit forest), 1 ♀, 1 juv., [Hebard Cln.].

Foot of Bald Knob, Bath County, Va., 3000 feet, VIII, 14, 1916, (Hebard; few immatures in decaying chestnut log), 1 juv., [Hebard Cln.].

Bald Knob, Bath County, Va., 3900 to 4000 feet, VIII, 19, 1906, (Hebard; decaying chestnut logs at upper limit of forest), 5 ♀, 4 juv., [Hebard Cln.].

Natural Bridge, Va., VIII, 4, 1915, (P. P. Calvert), 1 ♂, [A. N. S. P.].

Draper's Valley, Va., 1 nearly adult ♂, *type*, [M. C. Z.].

Mountain Lake, Giles County, Va., VII, 28, 1915, (P. P. Calvert), 1 adult, [A. N. S. P.].

Stone Mountain, Va., (Pollock), 1 adult, [U. S. N. M.].

Cumberland Mountains, Lee County, Va., VIII, 1879, (H. G. Hubbard), 1 adult, [M. C. Z.].

Blowing Rock, North Carolina, (Willcox), 1 ♀, [A. N. S. P.]; VII, 19, 1903, (A. P. Morse), 5 adults, 1 juv., [Morse Cln.]; VIII, 13, (G. P. Englehardt), 6 adults, [Bklyn. Inst.].

Linville, N. C., VII, 18, 1903, (A. P. Morse), 1 adult, 10 juv., [Morse Cln.].

Pisgah Forest, N. C., VIII, 12, 1908, 2 adults, 1 juv., [U. S. N. M.].

Sulphur Springs, N. C., 2500 feet, V, 25 to VI, 13, 1904, (Hebard; in decaying chestnut logs), 45 adults, 35 juv., [Hebard Cln. and A. N. S. P.].

Old Bald Mountain, N. C., V, 14, 1904, (Hebard), 3 adults, 1 juv., [Hebard Cln.].

Balsam, N. C., VII, 23, 1903, (A. P. Morse), 1 adult, [Morse Cln.].

Black Rock Mountain, Georgia, 3000 feet, V, 20 to 25, 1911, 1 juv. ♂, [Hebard Cln.].

Wilson Gap, Mountain City, Ga., VIII, 22, 1913, (J. C. Bradley), 6 adults, 2 juv. [Ga. State and Hebard Clns. and A. N. S. P.].

Clayton, Ga., 2000 to 3700 feet, VI, 1909, (W. T. Davis), 4 adults, 2 juv., [Davis Cln. and A. N. S. P.]; VIII, 18, 1 ♂, [Ga. State Cln.].

Rome, Georgia, 700 to 1500 feet, VIII, 31, 1 ♀, [A. N. S. P.].

Delashmut Creek, West Virginia, VII, 21, 1900, 1 adult, [U. S. N. M.].

Coalburg, West Va., 1874, (Edwards), 1 adult, [M. C. Z.].

Hinton, West Va., (W. P. Hay), 1 adult, [U. S. N. M.].

South Robling, Kentucky, VII, 19, (H. Garman), 1 juv., [M. C. Z.].

Near Mammoth Cave, Ky., X, 2, (Putnam), 1 juv., [M. C. Z.].

Between Osceola and Greensburg, Ky., VII, 17, (H. Garman), 2 small juv., [M. C. Z.].

Corbin, Ky., VIII, 24, 1 juv., [U. S. N. M.].

Cumberland Gap, Tennessee, (G. Dimmock), 1 adult, [M. C. Z.].

Chehalis, Washington, VII, 1896, 1 ♂, [Hebard Cln.].

Glendale, Oregon, VII, 12, 1909, (Rehn and Hebard; in decaying fir logs), 3 ♂, 3 ♀, 9 juv. ♂ in last instar, 1 juv. ♀ in last instar, 1 small juv. ♂, [Hebard Cln. and A. N. S. P.].

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SUPPLEMENT. ADVENTIVE MATERIAL

In the following pages are listed the Blattidae which, in various ways, have been found to be adventive, but not established, in portions of the United States and Canada. These represent thirty-one species, of which eight are also native in southern portions of the United States. One hundred and forty-one specimens have been examined.

It is clear that almost any exotic species may be carried alive by commerce to this country, this being facile in the case of forms which are domiciliary to various degrees. It is equally evident that, unless particularly adapted to the environmental and climatic conditions encountered, hardly any possibility exists of their becoming permanently established. Thus, species from Europe and other regions of temperate climate might easily become firmly established. Species from the tropics, however, could not survive in the United States, except possibly in the very limited tropical areas on the southern border of this country, or elsewhere under precarious artificial conditions.

The enormous number of species which might be brought to this country, without any likelihood of becoming established, is illustrated by the observations made by the author on the fruit steamer "Tenadores." After leaving New York with hold empty, eight species of tropical Blattidae were secured; of these four only have been found adventive in United States. Of these four, two are also apparently native in the southernmost regions of the United States; none have been introduced and become established. To treat fully each species which is recorded as adventive, but not established, would in consequence be of little real value. The systematic analysis would require a comparative discussion and treatment of allied species which have no bearing whatever on the species native in the United States.

In the preparation of the present paper, we have made no effort to discuss the adventive species, but careful comparisons have been made with all of the related exotic species available, and the literature has been studied for all of these, in order to insure as nearly correct determinations as possible.

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In the main portion of the present work the following ten species, which we feel satisfied are established adventives in this country, are fully treated.

	Probable origin	Distribution in United States
Blattella germanica	Europe	General
Supella supellectilium	Circumtropical	Tropical Florida
Symploce lita	American tropics	Tropical Florida
Leurolestes pallidus	Circumtropical	Tropical Florida
Blatta orientalis	Asia	General
Periplaneta australasiae	Asia	Southeastern United States
Periplaneta brunnea	American tropics	Southeastern United States
Neostylopyga rhombifolia	Circumtropical	Southern Arizona
Blaberus craniifer	North American tropics	Tropical Florida
Holocompsa nitidula	American tropics	Tropical Florida

It is of interest to note that these species are all domiciliary, or at least they prefer to live under the changed conditions brought about by the proximity of human habitations.

Six of these species have become established only in the extremely limited tropical areas on the southern border of the United States.

The adventives of frequent occurrence, but not established in all, or in all but the southernmost portions, of the United States, are seven in number; of these *Periplaneta australasiae* is established in the southeastern United States, *Pycnoscelus surinamensis* appears to be a species native in the southern portions of that area, while *Panchlora cubensis* is native in the tropical Brownsville region of Texas.

Nyctibora noctivaga
Nyctibora laevigata
Epilampra maya
Periplaneta australasiae
Pycnoscelus surinamensis
Panchlora cubensis
Blaberus discoidalis

The remaining species are known to be rarely adventive;—of these there is a possibility that *Ischnoptera rufa occidentalis* has become established on the Gulf Coast; while *Parcoblatta lata*, *Eurycotis floridana*, *Periplaneta americana* and *brunnea* and *Holocompsa nitidula*, are rarely introduced in the portions of the country where they are neither native or established.

It may be noted that the importation of tropical fruit is easily the chief means of introduction of exotic Blattidae.

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We have been fortunate in having additional material for comparison, from places where the species are native, of all the species here considered, excepting *Platyzosteria bifida* and *Hormetica advena*.

PSEUDOMOPINAE

Latiblattella species

A female of a species of this genus, related to *L. pavida* (Rehn), is before us.

As the steamship Tenadores had on previous trips loaded bananas only at Bocas del Toro, Panama, and Limon, Costa Rica, the material found on that ship and recorded in the present paper was almost certainly taken on at one of the two places.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, [Hebard; alive in hold), 1 ♀, [Hebard Cln.].

Cariblatta insularis (Walker)

1868. *Blatta insularis* Walker, Cat. Blatt. Br. Mus., p. 101. [♀, Jamaica.]

This very small insect, with head strikingly marked, delicate picturing of the pronotum and two proximal darker dashes on each of the elongate tegmina, is known to be native in Porto Rico, Jamaica and Antigua.

Washington, District of Columbia, IV, 19, 1910, (H. S. Barber; at light[398]), 1 ♂,[399] [U. S. N. M.].

Neoblattella fratercula Hebard

1916. *Neoblattella fratercula* Hebard, Ent. News, xxvii, p. 159. [♂, ♀; Isla de Cocos, Costa Rica, and material listed below.]

The present species is the smallest known of the North American species of *Neoblattella*. It shows some affinity to *N. brunneriana*,

[398] The specimen is without question adventive, having probably escaped from fruit in nearby stands.

[399] The subgenital plate of this specimen is evidently distorted and does not agree with a large topotypic Jamaican series before us, which have the subgenital plate symmetrical with sinistral specialized style distinctive. See Hebard, Trans. Am. Ent. Soc. xlii, p. 175 and p. 160, footnote 16, (1916). In the present specimen the median production of the subgenital plate is distorted; the sinistral style irregularly formed, showing three spines. In all other respects the specimen is normal and these features are in our opinion best referable to decided individual abnormality.

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and also may be said to show the nearest approach, in the present genus, to the South American complex of the genus *Cariblatta*.[400]

Lincoln, Nebraska, VII, 15, (in bananas, probably from Central America), 1 ♂, [Hebard Cln.].

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 2 ♀, [Hebard Cln.].

Neoblattella detersa (Walker)

1868. *Blatta detersa* Walker, Cat. Blatt. Br. Mus., p. 215. [♀, Jamaica.]

This plain and medium-sized species shows a remarkable and distinctive specialization of the male subgenital plate. Material from Hayti and Jamaica is before us. In the latter island the insect is abundant.

Green Bay, Wisconsin, VI, 1, 1915, (N. F. Howard), 1 ♂, [Hebard Cln.].

Neoblattella nahua (Saussure and Zehntner)

1893. *Blatta nahua* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 42, pl. iv, figs. 19 to 21. [♂, ♀: Mexico; Atoyac, Vera Cruz, Mexico; Tabasco, Mexico.]

This large species is closely allied to the genotype, *N. adspersicollis* (Stål), from which species it is readily separable by excellent male genitalic and other characters. The superficial resemblance of the two species is remarkable.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

Neoblattella fraterna (Saussure and Zehntner)

1893. *Blatta fraterna* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 44. [♂, Chontales, Nicaragua.]

This very broad, medium-sized species is nearest in relationship to *N. nahua*, of the known species of the genus, but shows very great differences, not only in size and form, but also in the genitalia of both sexes.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♂, [Hebard Cln.].

[400] See Hebard, Trans. Am. Ent. Soc., xlii, p. 152, (1916).

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Ischnoptera rufa occidentalis Saussure.[401]

1862. *I[schnoptera] occidentalis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 170. [♀; [New [Orleans, Louisiana].]

The specimen listed below and the type of this common reddish insect, furnish the only records of the species from north of Vera Cruz, Mexico. Extensive study and field work along the Gulf Coast in the United States, leads us to be strongly of the opinion that these two northern records are based on adventive, rather than indigenous, material.

Gulf coast of Texas, (Aaron), 1 ♀, [M. C. Z.].

Parcoblatta lata (Brunner)

1865. *I[schnoptera] lata* Brunner, Nouv. Syst. Blatt., p. 135. (Exclusive of synonymy.) [♂, North America?]

This species, widely distributed throughout the southeastern United States, is fully discussed on page 126.

Wellesley, Massachusetts, VII, 3, 1916, (A. P. Morse; in house), 1 ♀, [Morse Cln.].

Xestoblatta festae (Griffini)

1896. *E[pilampra] festae* Griffini, Boll. Mus. Zool. Anat. comp. Univ. Torino, xi, no. 236, p. 2. [[♀]; Punta de Sabana, Darien.]

This relatively robust, shining reddish-brown insect, belonging to a genus of the group Ischnopterites, has recently been fully discussed.[402]

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

NYCTIBORINAE

Nyctibora noctivaga Rehn

1902. *Nyctibora noctivaga* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♀; Machuca, Nicaragua.]

This great brown roach, one of the largest species of the genus, is found to be native in Central America and Jamaica.[403] The

[401] See Hebard, Trans. Am. Ent. Soc., xlii, p. 352, pl. xvi, fig. 7, (1916).

[402] See Hebard, Trans. Am. Ent. Soc., xlii, p. 377, pl. xix, figs. 8 to 11, (1916).

[403] The only other species of like size, is the apparently very closely related Brazilian *N. brunnea* of Thunberg, of which *N. holosericea* Burmeister is a synonym, according to Shelford. Serville's *N. tomentosa*, of which *N. latipennis* of Burmeister is probably a synonym, as has been admitted by its author (Zeitschr. Ent., Germar, ii, p. 24, (1840)), is even larger, with antennae showing a pale annulus.

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numerous adventive records of *N. holosericea*, probably, and the two records of *N. mexicana*,[404] from the United States and Canada, apply to this species.

In the present genus the immature females differ from adults of that sex in having the subgenital plate strongly triangularly produced dextrad, with apex rounded; in the early stages the seventh ventral abdominal segment is not concealed, the styles remaining visible.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; found dead), 1 juv. ♂, 1 juv. ♀, [Hebard Cln.].

Toronto, Ontario, (E. M. Walker; in bananas), 1 juv. ♂, [Univ. Toronto Cln.].

Framingham, Massachusetts, V, 25, 1915, (in store), 1 juv. ♂, [Morse Cln.].

Wellesley, Mass., I, 15, 1904, (in bananas), 1 ♂, [Morse Cln.].

Hyde Park, Mass., X, 1, 1903, (M. E. Cherrington; in house), 1 juv. ♀, [Morse Cln.].

Dalton, Mass., I, 2, 1899, (E. A. Halle), 1 juv. ♂, [U. S. N. M.].

Lynchburg, Virginia, VIII, 22, 1891, (W. A. Strother; in bananas), 1 ♀, [U. S. N. M.].

Ohio, 1 juv. ♂, [U. S. N. M.].

Chicago, Illinois, (Burton; in bananas), 1 juv. ♀, [U. S. N. M.].

Iowa City, Iowa, (C. F. Wickham), 1 juv. ♂, [Hebard Cln.].

Lyons, Nebraska, (in fruit), 1 juv. ♂, [Hebard Cln.].

Wahoo, Nebr., IX, 12, 1903, (in bananas), 1 ♂, [Hebard Cln.].

Lincoln, Nebr., (in bananas), 1 juv. ♂; II, 1 juv. ♀; V, 28, 1890, (B. Shimek; in grocery store), 1 ♀, [all Hebard Cln.].

Fairbury, Nebr., VIII, 1893, (in bananas), 1 ♀, 1 juv. ♂, [Hebard Cln.].

Oak, Nebr., IV, 1903, (P. C. Mercer; in bananas), 1 juv. ♂, [Hebard Cln.].

Longmont, Colorado, (fruit case in grocery store), 1 juv. ♂, [U. S. N. M.].

Texas, (unquestionably adventive), 1 ♀, [Univ. Kansas Cln.].

Medicine Hat, Alberta, III. 6, 1903, 1 juv. ♀, [Univ. Toronto Cln.].

Idaho Falls, Idaho, (in bananas), 1 juv. ♀, [U. S. N. M.].

Los Angeles, California, V, 23, 1903, 1 juv. ♀, [U. S. N. M.].

Claremont, Cal., (E. O. Essig; unquestionably adventive), 1 ♂, [State Insectary, Cal.].

Nyctibora laevigata (Beauvois)[405]

1805. *Blatta laevigata* Beauvois, Ins. Rec. Afr. et Amér., p. 228, Orth. pl. II, fig. 4. [San Domingo.]

This distinctive, smaller, ovate and brilliantly colored species, native in Hayti and Jamaica, is represented by the adventive

[404] Based on the specimens recorded below from Texas and Colorado.

[405] For the full history and discussion of this species see Rehn and Hebard, Ent. News, XXV, pp. 121–123, (1914).

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material listed below. The species has been thrice recorded as *N. sericea*[406] from the United States.

Toronto, Ontario, (C. W. Nash; in bananas), 1 ♂, [Univ. Toronto Cln.].
Orono, Maine, V, 16, 1889, (in bunch of bananas), 1 ♀, [Maine Agr. Exp. Sta. Cln.].
Manchester, New Hampshire, 1 ♀, [Morse Cln.].
Massachusetts, 1 ♀, [U. S. N. M.].
Boston, Mass., II, 20, 1887, (F. H. Sprague), 1 ♂,[407] [M. C. Z.].
Wellesley, Mass., 1899, (on bananas), 1 juv. ♀,[408] [Morse Cln.].
Natick, Mass., summer of 1902, (in fruit store), 1 ♂, 1 ♀, [Morse Cln.].
Springfield, Mass., VIII, 17, 1898, (C. Ladd), 1 ♀,[409] [M. C. Z.].
Manahawkin, New Jersey, IX, 1, 1913, (F. Haimbach), 1 ♀, [A. N. S. P.].
Philadelphia, Pennsylvania, (P. Laurent; Delaware wharf), 1 ♂,[410] [Hebard Cln.].
Germantown, Pa., (H. C. Thompson; in bananas), 1 ♀, [Thompson Cln.].
Harrisburg, Pa., 1 ♂, [Pa. State Dept. Zool.].
Lock Haven, Pa., V, 30, (in bananas), 1 ♀, [Pa. State Dept. Zool.].

Epilamprinae

Epilampra maya Rehn

1902. *Epilampra maya* Rehn, Trans. Am. Ent. Soc., xxix, p. 3. [♀;[411] Machuca, Nicaragua.]

The present species is medium-small for the genus, rather stout, rather pale and little marked, with elongate tegmina having two or more small dark brown spots on distal half. It is native in Central America; large South America series before us show several closely related but distinct species.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; found dead), 1 ♂, 1 ♀, [Hebard Cln.].
Woodstock, Vermont, VIII, 1911, 1 ♀, [Morse Cln.].
Framingham, Massachusetts, IV, 10, 1914, (C. A. Frost; in bananas in grocery store), 1 ♀, [Morse Cln.].
Boonton, New Jersey, 1 ♀, [A. N. S. P.].

[406] Shelford has synonymized *sericea* of Burmeister, under *limbata* of Thunberg. This is a similarly marked South American species, with tegmina and wings, however, proportionately much longer and more of the type generally found in the genus, than in *laevigata*.

[407] Twice recorded in 1900 by Scudder as *sericea*.

[408] Recorded by Morse in 1900 as *Eurycotis* sp., "possibly *E. finschiana* (Sauss.)."

[409] Recorded in 1900 by Henshaw as *sericea*.

[410] Recorded by Rehn as *sericea* in 1902.

[411] This specimen was unfortunately given as a representative of the male sex in the original description.

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BLATTINAE

Platyzosteria bifida (Saussure)

1872. *P[olyzosteria] bifida* Saussure, Mélang. Orth., ii, p. 110. [♂; Queensland, Australia.].

This insect suggests a flattened, unicolorous, dark Periplanetid; closer examination, however, shows the very different features of the genus, while the species is distinctive in the genitalia and the extraordinarily specialized maxillary palpus of the male.

That an individual of the Australasian group to which this insect belongs should be brought to America, shows how very widely roaches may be distributed by commerce.[412]

Fairbury, Nebraska, VIII, 1893, (in bananas), 1 ♂, [Hebard Cln.].

Eurycotis[413] caraibea (Bolivar)

1888. *P[olyzosteria] caraibea* Bolivar, Mém. Soc. Zool. Fr., i, p. 126. [♂, Cuba.]

This medium-small, pale, Cuban species is distinctive in having, with the black interocular band and two black disto-dorsal abdominal segments and supra-anal plate, the tegmina quadrate but not attingent.

Ithaca, New York, VII, 9, 1895, (in bunch of bananas), 1 ♂, [Hebard Cln.].
Berwick, Pennsylvania, VIII, 25, 1908, 1 ♂,[414] [Pa. State Dept. Zool.].

Eurycotis tibialis Hebard

1916. *Eurycotis tibialis* Hebard, Ent. News, xxvii, p. 261, pl. xiv, fig. 2, text fig. [♂, ♀; San Francisco Mountains, San Domingo; adventive at Orono, Maine.]

This blackish species, having subtriangular lateral tegmina, is known only from the material originally discussed.

Orono, Maine, 1 ♀, [Morse Cln.].

[412] Shelford has recorded a specimen, evidently an adventive also, from Brazil. Trans. Ent. Soc. London, 1909, p. 274, (1909).

[413] The questioned record of an immature example as *Eurycotis finschiana* (Saussure), adventive in the United States, is here definitely referred to *Nyctibora laevigata* (Beauv.).

[414] This specimen differs from the description of the species and the other individual before us, in having the tegmina decidedly reduced in width and consequently more lateral, with intervening space decidedly greater than the width of a tegmen. In other respects the specimen is so fully typical, that this difference seems best attributable to individual variation.

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Eurycotis floridana (Walker)

1868. *Periplaneta floridana* Walker, Cat. Blatt. Br. Mus., p. 135, [♀: St. John's Bluff, east Florida; North America.]

This species, which is native and apparently confined in distribution to the Sabalian and Tropical Floridian Zones of the southeastern United States, is fully discussed on page 166. The present adventive example was probably shipped north in packing boxes or other freight.

Beaver, Pennsylvania, VII, 18, 1 ♀, [Pa. State Dept. Zool.].

Eurycotis opaca (Brunner)

1865. *P[olyzosteria] opaca* Brunner, Nouv. Syst. Blatt., p. 216. [♂, Cuba.].

This Cuban species is closely related to *E. floridana*. It is distinguished by its larger size, generally rougher surface, decidedly broader head and normal darker coloration.

Orono, Maine, VI, 18, 1909, 1 ♀, [Maine Agr. Exp. Sta. Cln.].

Rochester Mill, Pennsylvania, VII, 28, 1908, 1 juv. ♂, in instar preceding maturity, [Pa. State Dept. Zool.].

Pelmatosilpha rotundata Scudder

1900. *Pelmatosilpha rotundata* Scudder, Proc. Davenport Acad. Nat. Sci., viii, p. 93, pl. 2, fig. 5. [♂, Texas; ♀, Panama.]

We have examined the figured male type from Texas, which we here designate as lectotype. There is no doubt that this specimen was accidentally introduced, almost certainly from Central America. In the unstudied series before us, the species is represented in material from that region, but is not found in any of the Mexican series.

The insect is a dark, glossy, medium-sized roach, with broadly rounded tegmina extending to the apex of the abdomen and showing no veins on their polished dorsal surfaces.

Periplaneta americana (Linnaeus)

1758. [*Blatta*] *americana* Linnaeus, Syst. Nat., Ed. X, p. 424. [America.]

This species is fully discussed on page 178.

Pequaming, Michigan, VI, 30, 1903, (Hebard; in store), 1 juv., [Hebard Cln.].

Milwaukee, Wisconsin, IX, 10, 1912, (A. C. Burrill), 1 ♂, [Wisc. Agr. Exp. Sta. Cln.].

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Periplaneta brunnea Burmeister

1838. *P[eriplaneta] brunnea* Burmeister, Handb. Ent., ii, abth. ii, pt. i, p. 503. [♂, ♀: Chile; Demerara [British Guiana].]

We have discussed this species on page 182.

Asheville, North Carolina, VIII, 1897, 1 ♀, [Hebard Cln.].

Periplaneta australasiae (Fabricius)

1775. [*Blatta*] *australasiae* Fabricius, Syst. Ent., p. 271. ["In nave e mare Pacifico et regionibus incognitis revertente."]

This species is fully discussed on page 185; it is constantly being introduced north of the regions in which it has become established, but is evidently much more decidedly affected by cold than *P. americana*, and in consequence has never become permanently established in the United States north of the areas in which the winter climate is comparatively mild. In the colder regions of the United States, when it has appeared in greenhouses and such artificially heated places, it has been found to breed and increase in numbers with great rapidity, temporarily becoming a dangerous pest, so that vigorous efforts have been found necessary to exterminate such a colony.[415]

North of Pennsylvania, occasional adventive specimens of the species are constantly being reported; such records are found from Montreal, Quebec; Toronto, Ontario; Wellesley, Massachusetts; Wallingford and New Haven, Connecticut, and from Minnesota.

The following adventive material is now before us.

Rutherford, New Jersey, XI, 19, 1915, (H. B. Weiss; in greenhouse), 2 ♂, [A. N. S. P.].

Philadelphia, Pennsylvania, VI, 30, 1898, 1 ♂, [A. N. S. P.].

Radnor, Pa., I, 14, 1905, (J. Hurley; swarming in greenhouses and adjacent homes), 3 ♂, 1 ♀, 1 juv. ♂, 2 juv. ♀, [A. N. S. P. and Hebard Cln.].

PANCHLORINAE

Leucophaea maderae (Fabricius)

1781. *B[latta] maderae* Fabricius, Spec. Ins., I, p. 341. [Madeira.]

This large insect is tawny olive in general coloration, inconspicuously marked with dark brown. It is domiciliary and very

[415] See Skinner, Ent. News, xvi, p. 183, (1905), on the appearance of the insect in great numbers on an estate at Radnor, Pennsylvania.

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widely distributed through the West Indies. An adventive specimen has been recorded from St. Johns, New Brunswick.

New York, New York, (on bananas), 1 ♂, [Bklyn. Inst.].

Pycnoscelus surinamensis (Linnaeus)

1767. [*Blatta*] *surinamensis* Linnaeus, Syst. Nat., Ed. XII, p. 687. [Surinam.]

This species is discussed on page 193; the adventive material before us is listed below.

Cromwell, Connecticut, III, 1, 1911, (B. H. Walden; from greenhouse), 2 ♀, [Hebard Cln.].

New York, New York, XI, 1913, (W. Beutenmüller; reptile house of N. Y. Zool. Soc.), 6 ♀, 1 juv. ♀, [A. N. S. P.].

Rutherford, New Jersey, XI, 19, 1915, (H. B. Weiss), 4 ♀, 2 juv. ♀, [A. N. S. P.].

Washington, District of Columbia, II, 1888, 1 ♀, 4 juv. ♀, [Hebard Cln.].

The species readily establishes itself in earth or debris and dust indoors, far north of its normal range,[416] provided the temperature is kept high during the cold months.

The specimens from New York and Rutherford are all very dark, the pale cephalic marking on the pronotum being obsolete mesad and only very narrowly indicated laterad at the cephalic angles.

Panchlora cubensis Saussure

1862. *P[anchlora] cubensis* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 230. [♀, Cuba.]

This insect is discussed on page 198; though it has never become established outside the tropics, living examples are constantly being shipped into the United States, far north of the species' normal distribution, the great majority of these coming in tropical fruits. The adventive material before us is listed below.

S. S. Tenadores, en route New York to Jamaica, X, 19, 1913, (Hebard; dead in hold), 1 ♀, [Hebard Cln.].

Orono, Maine, 1892, (in tropical fruit), 1 ♀, [Maine Agr. Exp. Sta. Cln.].

Augusta, Me., 1906, 1 ♀, [U. S. N. M.].

Boston, Massachusetts, XII, 26, 1878, (S. Kneeland; flying in store), 1 ♀, [M. C. Z.].

Stoneham, Mass., XI, 15, 1915, (C. V. Blackburn), 1 ♀, [Morse Cln.].

[416] An immature specimen, taken from a bunch of bananas, has been recorded from Toronto, Ontario.

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Melrose, Mass., VI, 17, 1914, (F. W. Dodge), 1 ♀, [Morse Cln.].

Wellesley, Mass., XII, 12, 1894, (Miss Hubbard; on window of Stone Hall), 1 ♀, [Morse Cln.].

Framingham, Mass., VIII, 1, 1914, (C. A. Frost; in grocery store), 1 ♀, [Morse Cln.].

Salem, Mass., VIII, 1, 1890, (E. S. Morse; in bathroom of house), 1 ♀, [M. C. Z.].

Albany, New York, III, 25, 1908, 1 ♀, [U. S. N. M.].

Brooklyn, N. Y., (on bananas), 1 ♀, [Bklyn. Inst.]; IX, 8, 1891, (C. L. Gissler), 1 ♀, [U. S. N. M.].

Staten Island, N. Y., III, 1906, 1 ♀; XII, 1910, 1 ♀, [both Davis Cln.].

New Brighton, Staten Island, N. Y., III, 1915, VIII, 9, 1912, (W. T. Davis; from bananas), 2 ♀, [Davis Cln.].

Newark, New Jersey, IX, 26, 1913, (F. Lange; on bananas), 1 ♀, [U. S. N. M.].

Philadelphia, Pennsylvania, III, 9, 1914, (E. R. Casey; alive in street), 1 ♀, [Casey Cln.]; 1 ♀, [A. N. S. P.].

Washington, District of Columbia, 1 ♀; XI, 19, 1915, (F. Knab), 1 ♀, [both U. S. N. M.].

Arlington, Virginia, VIII, 1913, (H. A. Allard; Experiment Farms), 1 ♀, [Hebard Cln.].

Madison, Wisconsin, IV, 8 to fall, 1915 and 1916, 3 ♀, [Wisc. Agr. Exp. Sta. Cln.].

Lincoln, Nebraska, I, 30, 1904, (L. Gooding; in bananas), 1 ♀; (Miss Fossler), 1 ♀; 1 ♀, [all Hebard Cln.].

Osceola, Nebr., (R. Heald), 1 ♀, [Hebard Cln.].

Douglas County, Kansas, (R. H. Beamer), 1 ♀, [Univ. Kansas Cln.].

Fort Collins, Colorado, (in bunch of bananas), 1 ♀, [Morse Cln.].

Stockton, Utah, III, 1915, (from bunch of bananas), 1 ♀, [Davis Cln.].

Bremerton, Washington, 1914, (F. G. Dunn), 1 ♀, [U. S. N. M.].

The nomenclatural confusion in the plain green species of the present genus is well shown by the past records for this series. The specimen from Boston has been recorded by Scudder as *viridis;* that from Salem by the same author as *nivea*, then as *viridis;* that from Albany as *hyalina* of Saussure by Felt, determined by Caudell; one of the Brooklyn examples by Riley as *viridis*, and one from Philadelphia by Rehn as *virescens*. These have further been the bases for subsequent records by Scudder of *poeyi* from "seaboard cities," by Bruner as *viridis* and *exoleta* indefinitely in the New Jersey list, while the species has been further recorded as *viridis* from Wellesley, Massachusetts, by Morse and from Pittsburg, Pennsylvania, by Riley. In the discussion of the

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species by Felt, the Boston, Salem and Brooklyn records are all placed under *hyalina* of Saussure.

In considering these various names, we can state that *viridis* and *nivea* are names referable to a South American complex, no individuals of which have appeared in collections of material adventive in the United States. Shelford has, after examination of the types, placed *virescens* in the synonymy under *nivea*, while *exoleta* is a normally larger insect, of which species the first specimen adventive in the United States, and hitherto unrecorded, is now before us. Saussure's *poeyi*, from the original description, appears to be an absolute synonym of his *cubensis*, based on the opposite (♂) sex, from Cuba. Saussure's *hyalina* (renamed *translucida* by Kirby) does not belong to the plain green species, being one of the forms in which the antennae bear a black annulus; *Blatta hyalina* of Stoll is a different insect, so poorly described and figured that it can merely be located as one of the plain green forms of the present genus, and in consequence, with type destroyed and no locality given, we believe that name best treated as unidentifiable.

Scudder has recorded the species as *viridis*, taken on a steamer en route from Jamaica to the United States, in order to show the usual means of introduction of the species. Wholly contrary to the opinion expressed by Felt, we do not believe the present insect can establish itself in temperate climates except under artificial conditions. It is essentially an out-of-doors dweller in the tropics and can not adapt itself to artificial surroundings, as the domiciliary forms do so readily.

Panchlora exoleta Burmeister

1838. *P[anchlora] exoleta* Burmeister, Handb. Ent., ii, abth. ii, pt. 1, p. 507. [Pará and Bahia, Brazil.]

This species is closely related to *P. cubensis*. Females may solely be distinguished by their average decidedly larger size and more opaque margins of the pronotum and marginal fields of the tegmina.[417]

[417] These characters are found in a series of the species before us.

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Salem, Massachusetts, VI, 7, 1884, (Mrs. H. King; probably in bananas), 1 ♀,[418] [Peabody Museum].

Panchlora zendala Saussure

1862. *P[anchlora] zendala* Saussure, Rev. et Mag. Zool., 2e sér., xiv, p. 231. [[♀; Izabal], Guatemala.]

This is a large greenish species with immaculate antennae, but with black lateral lines on pronotum and tegmina.

Madison, Wisconsin, V, 24, 1916, (L. S. Cole), 1 ♀, [Hebard Cln.].

BLABERINAE

Blaberus colosseus (Illiger)[419]

1802. *Blatta colossea* Illiger, Mag. Insektenkunde, i, p. 186. [Demerara, [= British Guiana].]

This insect, with the even larger *B. gigantea*, represents the maximum size development found in the genus and is of the palest general coloration.

This species has been recorded from New Orleans, Louisiana, by Saussure as the synonymous *B. mexicana*.

Blaberus discoidalis[420] Serville

1839. *Blabera discoidalis* Serville, Hist. Nat. Ins., Orth., p. 76. [♀, San Domingo.]

The species is moderately small for the genus, with tegmina and wings extending little beyond the apex of the abdomen, this particularly striking in the female sex; the general coloration is of the normal moderately pale brown found in numerous species of the genus.

The New Jersey adventives before us are decidedly large for the species. The female from Secaucus has the dark pronotal marking exceptionally extensive, covering all but the rather narrow cephalic and lateral margins.

This species appears to gain occasionally a temporary footing in greenhouses in the United States, being introduced in tropical plants.

[418] The measurements of this specimen are: length of body, 20; length of pronotum, 7.1; width of pronotum (crushed), 9.2; length of tegmen, 25.6; width of tegmen, 7.8 mm.

[419] For the synonymy under this species see Hebard, Ent. News, xxvii, p. 291, (1916).

[420] For the synonymy under this species see Hebard, Ent. News, xxvii, p. 294, (1916).

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New York, New York, (M. L. Small), 1 ♂, [U. S. N. M.].

Rutherford, New Jersey, VI, 12, 1916, (H. B. Weiss; in greenhouse), 1 ♂, 1 ♀, [Hebard Cln.].

Secaucus, N. J., VI, 1, 1916, (H. B. Weiss; in greenhouse), 1 ♀, 1 juv. ♀, [A. N. S. P.]; X, 17, 1916, (H. B. Weiss; in case of orchids from Colombia), 2 ♀, [Weiss and Hebard Clns.].

CORYDIINAE

Holocompsa nitidula (Fabricius)

1781. *B[latta] nitidula* Fabricius, Spec. Ins., i, p. 345. [[♀, from description], Surinam.]

This species is fully discussed on page 206.

Washington, District of Columbia, (D. Clemens; on cotton batting in store room of National Museum), 1 ♀, [U. S. N. M.].

OXYHALOINAE

Plectoptera picta Saussure and Zehntner

1893. *Plectoptera picta* Saussure and Zehntner, Biol. Cent.-Amer., Orth., i, p. 85, pl. iii, fig. 9. [♀; Atoyac, Vera Cruz, Mexico.]

This beautiful insect is distinctively colored. The character of the labels leaves some doubt as to whether the material listed below is really adventive, the specimens clearly representing odds and ends which had been marked with little care.

Virginia, 1 ♀, [U. S. N. M.].

Texas, 1 ♂, [U. S. N. M.].

PERISPHAERINAE

Hormetica advena Scudder

1900. *Hormetica advena* Scudder, Proc. Davenport Acad. Nat. Sci., viii, p. 94. [♀; Belmont, Massachusetts.]

This striking insect is known from the unique type.

Belmont, Massachusetts, XII, (G. H. Parker; "unquestionably introduced from tropical America"), 1 ♀, *type*, [M. C. Z.].

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Explanation of Plates

Plate I

Fig. 1.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal view. (×3)

Fig. 2.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal outline of supra-anal plate. (×12)

Fig. 3.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Caudal view of subgenital plate. (×12)

Fig. 4.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Dorsal view of concealed genitalic process. (Greatly enlarged.)

Fig. 5.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Caudal view of concealed genitalic process. (Greatly enlarged.)

Fig. 6.—*Euthlastoblatta abortiva* (Caudell). Brownsville, Texas. Male. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 7.—*Euthlastoblatta abortiva* (Caudell). Esperanza Ranch, near Brownsville. Texas. Female. *Type*. Dorsal View. (×3)

Fig. 8.—*Euthlastoblatta abortiva* (Caudell). Esperanza Ranch, near Brownsville, Texas. Female. *Type*. Dorsal view of supra-anal plate. (×6)

Fig. 9.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Dorsal view. (×3)

Fig. 10.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Ventral view of subgenital plate. (About ×12)

Fig. 11.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Paratype*. Caudal view of subgenital plate. (About ×12)

Fig. 12.—*Aglaopteryx gemma* new species. Mobile, Alabama. Male. *Type*. Cephalic outline of cephalic femur. (Much enlarged.)

Fig. 13.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Dorsal view. (×3)

Fig. 14.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 15.—*Latiblattella rehni* new species. Miami, Florida. Male. *Type*. Dorsal view of distal abdominal segments, showing specialization. (Much enlarged.)

Fig. 16.—*Latiblattella rehni* new species. Lakeland, Florida. Male. Chitinous thorn of concealed genitalia. (Greatly enlarged.)

Fig. 17.—*Latiblattella rehni* new species. Miami, Florida. Female. *Allotype*. Dorsal view. (×3)

Fig. 18.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Dorsal view. (×3)

Fig. 19.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

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Fig. 20.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Dorsal view of distal abdominal segments, showing specialization. (Much enlarged.)

Fig. 21.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Chitinous thorn of concealed genitalia. (Greatly enlarged.)

Fig. 22.—*Latiblattella lucifrons* new species. Santa Rita Mountains, Arizona. Male. *Type*. Caudal view of subgenital plate. (Much enlarged.)

Fig. 23.—*Latiblattella lucifrons* new species. Huachuca Mountains, Arizona. Female. Dorsal view. (×3)

Fig. 24.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of pronotum. (×3)

Fig. 25.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of tegmen. (×3)

Fig. 26.—*Supella supellectilium* (Serville). Key West, Florida. Male. Dorsal view of abdomen. (×3)

Fig. 27.—*Supella supellectilium* (Serville). Key West, Florida. Male. Projecting chitinous plate of concealed genitalia. (Greatly enlarged.)

Plate II

Fig. 1.—*Cariblatta lutea lutea* (Saussure and Zehntner). Ormond, Florida, Male. Dorsal view. (×4½)

Fig. 2.—*Cariblatta lutea lutea* (Saussure and Zehntner). Spring Creek, Georgia. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 3.—*Cariblatta lutea minima* Hebard. Miami, Florida Male. *Type*. Dorsal view. (×4½)

Fig. 4.—*Cariblatta lutea minima* Hebard. Miami, Florida. Male. *Type*. Cephalic outline of cephalic femur.[1] (Much enlarged.)

Fig. 5.—*Cariblatta lutea minima* Hebard. Miami, Florida. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Fig. 6.—*Blattella germanica* (Linnaeus). St. Louis, Missouri. Male. Dorsal view of tegmen. (×3)

Fig. 7.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of abdomen. (×3)

Fig. 8.—*Blattella germanica* (Linnaeus). Miami, Florida. Male. Dorsal view of pronotum. (×3)

Fig. 9.—*Blattella germanica* (Linnaeus). St. Louis, Missouri. Male. Dextral chitinous process of concealed genitalia. (Greatly enlarged.)

Fig. 10.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Dorsal outline. (×2)

Fig. 11.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Cephalic outline of cephalic femur.[2] (Much enlarged.)

[1] Characteristic of the genus *Cariblatta*.

[2] Characteristic of the genus *Ischnoptera*.

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Fig. 12.—*Ischnoptera deropeltiformis* (Brunner). Mountain Grove, Missouri. Male. Lateral outline of one of two processes of sixth dorsal abdominal segment. (Greatly enlarged.)

Fig. 13.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Dorsal outline of supra-anal plate. (Much enlarged.)

Fig. 14.—*Ischnoptera deropeltiformis* (Brunner). Plummer's Island, Maryland. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 15.—*Ischnoptera deropeltiformis* (Brunner). Washington, District of Columbia. Female. Dorsal outline. (×2)

Fig. 16.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Dorsal outline. (×3)

Fig. 17.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Cephalic outline of head. (Much enlarged.)

Fig. 18.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Cephalic outline of cephalic femur.[3] (Much enlarged.)

Fig. 19.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Dorsal view of supra-anal plate. (Much enlarged.)

Fig. 20.—*Symploce lita* Hebard. Key West, Florida. Male. *Type*. Ventral view of subgenital plate. (Much enlarged.)

Plate III

Fig. 1.—*Parcoblatta bolliana* (Saussure and Zehntner). Sulphur Springs, North Carolina. Male. Dorsal view. (×3)

Fig. 2.—*Parcoblatta bolliana* (Saussure and Zehntner). Sulphur Springs, North Carolina. Male. Ventral view of subgenital plate.[4] (×5½)

Fig. 3.—*Parcoblatta bolliana* (Saussure and Zehntner). Raleigh, North Carolina. Female. Dorsal view. (×3)

Fig. 4.—*Parcoblatta desertae* (Rehn and Hebard). Sabinal, Texas. Male. Dorsal view. (×3)

Fig. 5.—*Parcoblatta desertae* (Rehn and Hebard). Sabinal, Texas. Male. Ventral view of subgenital plate. (×5½)

Fig. 6.—*Parcoblatta desertae* (Rehn and Hebard). Fort Davis, Texas. Female. Dorsal view. (×3)

Fig. 7.—*Parcoblatta americana* (Scudder). Sonoma County, California. Male. Dorsal view. (×3)

Fig. 8.—*Parcoblatta americana* (Scudder). Sonoma County, California. Male. Ventral view of subgenital plate. (×5½)

Fig. 9.—*Parcoblatta americana* (Scudder). Mount Shasta, California. Female. Dorsal view. (×3)

[3] Characteristic of the genus *Symploce*.

[4] In the genus *Parcoblatta*, the styles of the male subgenital plate are little dissimilar. These styles are movable and are drawn as they happen to lie in the various specimens here figured.

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Fig. 10.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view. (×3)

Fig. 11.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 12.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Dorsal view of supra-anal plate. (×5½)

Fig. 13.—*Parcoblatta zebra* new species. Pulaski, Illinois. Male. *Type*. Ventral view of subgenital plate. (×5½)

Fig. 14.—*Parcoblatta zebra* new species. Havana, Illinois. Female. *Allotype*. Dorsal view. (×3)

Fig. 15.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view. (×3)

Fig. 16.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 17.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 18.—*Parcoblatta notha* (Rehn and Hebard). Arizona. Male. Ventral view of subgenital plate. (×5½)

Fig. 19.—*Parcoblatta notha* (Rehn and Hebard). Palmerlee, Arizona. Female. *Allotype*. Dorsal view. (×3)

Plate IV

Fig. 1.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view. (×3)

Fig. 2.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 3.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 4.—*Parcoblatta virginica* (Brunner). Black Mountains, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 5.—*Parcoblatta virginica* (Brunner). Upsal, Philadelphia, Pennsylvania. Female. Dorsal view. (×3)

Fig. 6.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal view. (×3)

Fig. 7.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 8.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Dorsal outline of dextral cercus. (Much enlarged.)

Fig. 9.—*Parcoblatta uhleriana* (Saussure). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 10.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Female. Dorsal view. (×3)

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Fig. 11.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Ootheca. Dorsal view of a portion of the sutural margin. (About ×7)

Fig. 12.—*Parcoblatta uhleriana* (Saussure). Whitemarsh, Pennsylvania. Ootheca. Cross-section showing remarkable specialization of sutural margin. (Much enlarged.)

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Fig. 14.—*Parcoblatta fulvescens* (Saussure and Zehntner). Thomasville, Georgia. Male. Dorsal outline of sinistral cercus. (Much enlarged.)

Fig. 15.—*Parcoblatta fulvescens* (Saussure and Zehntner). Spring Creek, Georgia. Female. Dorsal view. (×3)

Fig. 16.—*Parcoblatta fulvescens* (Saussure and Zehntner). Brownsville, Texas. Female. Dorsal view showing more rotundate tegmina. (×3)

Plate V

Fig. 1.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view. (×3)

Fig. 2.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 3.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Dorsal view of supra-anal plate. (×5½)

Fig. 4.—*Parcoblatta caudelli* new species. Raleigh, North Carolina. Male. *Type*. Ventral view of subgenital plate. (×5½)

Fig. 5.—*Parcoblatta caudelli* new species. Spartanburg, South Carolina. Female. *Allotype*. Dorsal view. (×3)

Fig. 6.—*Parcoblatta lata* (Brunner). Natchez, Mississippi. Male. Dorsal view of pronotum. Exceptional intensive coloration. (×3)

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Fig. 8.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Dorsal view of median and first dorsal abdominal segments. (×5½)

Fig. 9.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 10.—*Parcoblatta lata* (Brunner). Thomasville, Georgia. Male. Ventral view of subgenital plate. (×5½)

Fig. 11.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Dorsal view of median and first abdominal segments. (×5½)

Fig. 12.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Lateral view of median and first dorsal abdominal segments. (×5½)

Fig. 13.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

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Fig. 14.—*Parcoblatta divisa* (Saussure and Zehntner). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Fig. 15.—*Parcoblatta divisa* (Saussure and Zehntner). Opelika, Alabama. Female. Dorsal view. Organs of flight exceptionally developed. (×3)

Fig. 16.—*Parcoblatta divisa* (Saussure and Zehntner). Augusta, Georgia. Female. Dorsal view. (×3)

Fig. 17.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Dorsal view of median and first dorsal abdominal segment. (×5½)

Fig. 18.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Lateral view of median and first dorsal abdominal segment. (×5½)

Fig. 19.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Dorsal view of supra-anal plate. (×5½)

Fig. 20.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Ventral view of subgenital plate. (×5½)

Plate VI

Fig. 1.—*Parcoblatta lata* (Brunner). Raleigh, North Carolina. Female. Dorsal view. (×6)

Fig. 2.—*Parcoblatta pensylvanica* (DeGeer). Raleigh, North Carolina. Male. Cephalic outline of cephalic femur.[5] (Much enlarged.)

Fig. 3.—*Parcoblatta pensylvanica* (DeGeer). Mount Airy, Philadelphia, Pennsylvania. Female. Dorsal view. (×6)

Fig. 4.—*Parcoblatta pensylvanica* (DeGeer). Iowa City, Iowa. Dorsal view of tegmen.[6] (×6)

Fig. 5.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Dorsal view. (×3)

Fig. 6.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 7.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Paratype*. Concealed genital hook. (Greatly enlarged.)

Fig. 8.—*Pseudomops septentrionalis* new species. Brownsville, Texas. Male. *Type*. Caudal outline of subgenital plate, showing the highly specialized styles. (Much enlarged.)

Fig. 9.—*Leurolestes pallidus* (Brunner). Key West, Florida. Male. Dorsal view. (×3)

Fig. 10.—*Leurolestes pallidus* (Brunner). Key West, Florida. Male. Cephalic outline of cephalic femur. (Much enlarged.)

Fig. 11.—*Eurycotis floridana* (Walker). Ojus, Florida. Male. Dorsal view. (×3)

Fig. 12.—*Eurycotis floridana* (Walker). Ojus, Florida. Male. Ventral view of subgenital plate. (×7)

[5] Characteristic for the genus *Parcoblatta*.

[6] Showing the maximum reduction in females of this species before us.

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Fig. 13.—*Eurycotis floridana* (Walker). Cedar Keys, Florida. Female. Dorsal view of supra-anal plate. (×7)

Fig. 14.—*Eurycotis floridana* (Walker). Cedar Keys, Florida. Female. Ventral view of subgenital plate. (×7)

Fig. 15.—*Neostylopyga rhombifolia* (Stoll). Nogales, Arizona. Female. Dorsal view. (×3)

Plate VII

Fig. 1.—*Blatta orientalis* Linnaeus. Chestnut Hill, Philadelphia, Pennsylvania. Male. Dorsal view. (×2)

Fig. 2.—*Blatta orientalis* Linnaeus. Marathon, Texas. Female. Dorsal view. (×2)

Fig. 3.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Dorsal view of pronotum, normal coloration. (×2)

Fig. 4.—*Periplaneta americana* (Linnaeus). Florence, Arizona. Male. Dorsal view of pronotum, maximum intensive coloration.[7] (×2)

Fig. 5.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Outline of sinistral tegmen and wing. (Natural size.)

Fig. 6.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 7.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Fig. 8.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Concealed dextral genital process. (Greatly enlarged.)

Fig. 9.—*Periplaneta americana* (Linnaeus). Big Pine Key, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 10.—*Periplaneta americana* (Linnaeus). Key West, Florida. Female. Dorsal view of supra-anal plate and cerci. (×2)

Fig. 11.—*Periplaneta americana* (Linnaeus). Philadelphia, Pennsylvania. Female. Ventral view of subgenital plate. (×2)

Fig. 12.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Dorsal view of pronotum. (×2)

Fig. 13.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)

Fig. 14.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Fig. 15.—*Periplaneta brunnea* Burmeister. Jewfish, Florida. Male. Ventral view of subgenital plate. (×3)

Fig. 16.—*Periplaneta brunnea* Burmeister. Fort Myers, Florida. Female. Dorsal view of supra-anal plate and cerci. (×2)

Fig. 17.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Dorsal view of pronotum. (×2)

[7] A close approach to this coloration is frequently found in *Periplaneta brunnea*.

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Fig. 18.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)
Fig. 19.—*Periplaneta australasiae* (Fabricius). Homestead, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)
Fig. 20.—*Periplaneta fuliginosa* (Serville). Crowley, Louisiana. Male. Dorsal view of pronotum. (×2)
Fig. 21.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Dorsal view of distal portion of abdomen and cerci. (×3)
Fig. 22.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Ventral view of supra-anal plate. (×6)
Fig. 23.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Ventral view of subgenital plate. (×3)
Fig. 24.—*Periplaneta fuliginosa* (Serville). Jacksonville, Florida. Male. Distal portion of concealed sinistral genital process. (Greatly enlarged.)

Plate VIII

Fig. 1.—*Pycnoscelus surinamensis* (Linnaeus). St. Augustine, Florida. Female. Dorsal view. (×2)
Fig. 2.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Dorsal view. (×3)
Fig. 3.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Cephalic view of head. (×9)
Fig. 4.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Male. Ventral view of subgenital plate and cerci. (Much enlarged.)
Fig. 5.—*Panchlora cubensis* Saussure. Esperanza Ranch near Brownsville, Texas. Female. Cephalic view of head. (×9)
Fig. 6.—*Blaberus craniifer* Burmeister. Key West, Florida. Male. Dorsal view. (Natural size.)
Fig. 7.—*Blaberus craniifer* Burmeister. Key West, Florida. Male. Ventral view of subgenital plate. (×3)
Fig. 8.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Male. Dorsal view. (×3)
Fig. 9.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Male. Ventral view of subgenital plate. (Much enlarged.)
Fig. 10.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Female. Dorsal view. (×3)
Fig. 11.—*Holocompsa nitidula* (Fabricius). Key West, Florida. Female. Ventral view of subgenital plate. (Much enlarged.)

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Plate IX

The concealed genital plates and hooks are given as seen from below, the subgenital plate having been removed. From this aspect the dextral plates naturally appear sinistral, and the sinistral hooks, dextral.

Fig. 1.—*Homoeogamia mexicana* Burmeister. Jalapa, Vera Cruz, Mexico. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 2.—*Homoeogamia mexicana* Burmeister. Jalapa, Vera Cruz, Mexico. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 3.—*Arenivaga bolliana* (Saussure). Brownsville, Texas. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 4.—*Arenivaga bolliana* (Saussure). Brownsville, Texas. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 5.—*Arenivaga bolliana* (Saussure). Carrizo Springs, Texas. Female. Dorsal view. (×2)

Fig. 6.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type*. Dorsal view. (×2)

Fig. 7.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type*. Lateral outline of maxillary palpus. (Much enlarged.)

Fig. 8.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type*. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 9.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Male. *Type*. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 10.—*Arenivaga rehni* new species. San José del Cabo, Lower California, Mexico. Female. *Allotype*. Dorsal view. (×2)

Fig. 11.—*Arenivaga erratica* Rehn. Hackberry Creek, Brewster County, Texas. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 12.—*Arenivaga erratica* Rehn. Hackberry Creek, Brewster County, Texas. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 13.—*Arenivaga erratica* Rehn. Georgetown, Texas. Female. Dorsal view. (×2)

Fig. 14.—*Arenivaga apacha* (Saussure). Phoenix, Arizona. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 15.—*Arenivaga apacha* (Saussure). Phoenix, Arizona. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 16.—*Arenivaga apacha* (Saussure). Death Valley, California. Female. Dorsal view. (×2)

Fig. 17.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Lateral outline of maxillary palpus.[8] (Much enlarged.)

[8] Characteristic of the genus *Eremoblatta*.

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Fig. 18.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Concealed dextral genital plates. (Greatly enlarged.)

Fig. 19.—*Eremoblatta subdiaphana* (Scudder). Sentinel, Arizona. Male. Concealed sinistral genital hook. (Greatly enlarged.)

Fig. 20.—*Eremoblatta subdiaphana* (Scudder). Mesilla Park, New Mexico. Female. Dorsal view. (×2)

Fig. 21.—*Eremoblatta hirsuta* new species. Sierra el Tosti, Lower California, Mexico. Male. *Type.* Dorsal view. (×2)

Fig. 22.—*Eremoblatta hirsuta* new species. San José del Cabo, Lower California, Mexico. Female. *Allotype.* Dorsal view. (×2)

Plate X

Fig. 1.—*Compsodes schwarzi* (Caudell). Esperanza Ranch near Brownsville, Texas. Male. Dorsal view. (×3)

Fig. 2.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Dorsal view of supra-anal plate. (Greatly enlarged.)

Fig. 3.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Caudal view of subgenital plate showing concealed genitalia. (Greatly enlarged.)

Fig. 4.—*Compsodes schwarzi* (Caudell). Brownsville, Texas. Male. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 5.—*Attaphila fungicola* Wheeler. Austin, Texas. Male. Dorsal outline. (×3)

Fig. 6.—*Attaphila fungicola* Wheeler. Austin, Texas. Male. Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 7.—*Chorisoneura texensis* Saussure and Zehntner. Brownsville, Texas. Male. Dorsal outline. (×3)

Fig. 8.—*Chorisoneura texensis* Saussure and Zehntner. Brownsville, Texas. Male. Ventral view of subgenital plate. (Much enlarged.)

Fig. 9.—*Plectoptera floridana* new species. Key West, Florida. Female. *Allotype.* Dorsal outline.[9] (×3)

Fig. 10.—*Plectoptera floridana* new species. Key West, Florida. Male. *Paratype.* Cephalic view of occiput, showing characteristic marking. (Greatly enlarged.)

Fig. 11.—*Plectoptera floridana* new species. Key West, Florida. Male. *Type.* Dorsal view of wing. (×3)

Fig. 12.—*Plectoptera floridana* new species. Key West, Florida. Male. *Type.* Ventral view of subgenital plate. (Greatly enlarged.)

Fig. 13.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Female. Dorsal view. (×1½)

[9] In this species the tegminal veins are scarcely visible when the tegmina are folded.

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Fig. 14.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Male. Subgenital plate. (×8)

Fig. 15.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Male. Supra-anal plate and cerci. (×8)

Fig. 16.—*Cryptocercus punctulatus* Scudder. Sulphur Springs, North Carolina. Female. Ventral view of concealed oviposition valves.[10] (Greatly enlarged.)

[10] These are found in the anal orifice, below the supra-anal plate. The subgenital plate has entirely disappeared in females of the present species.

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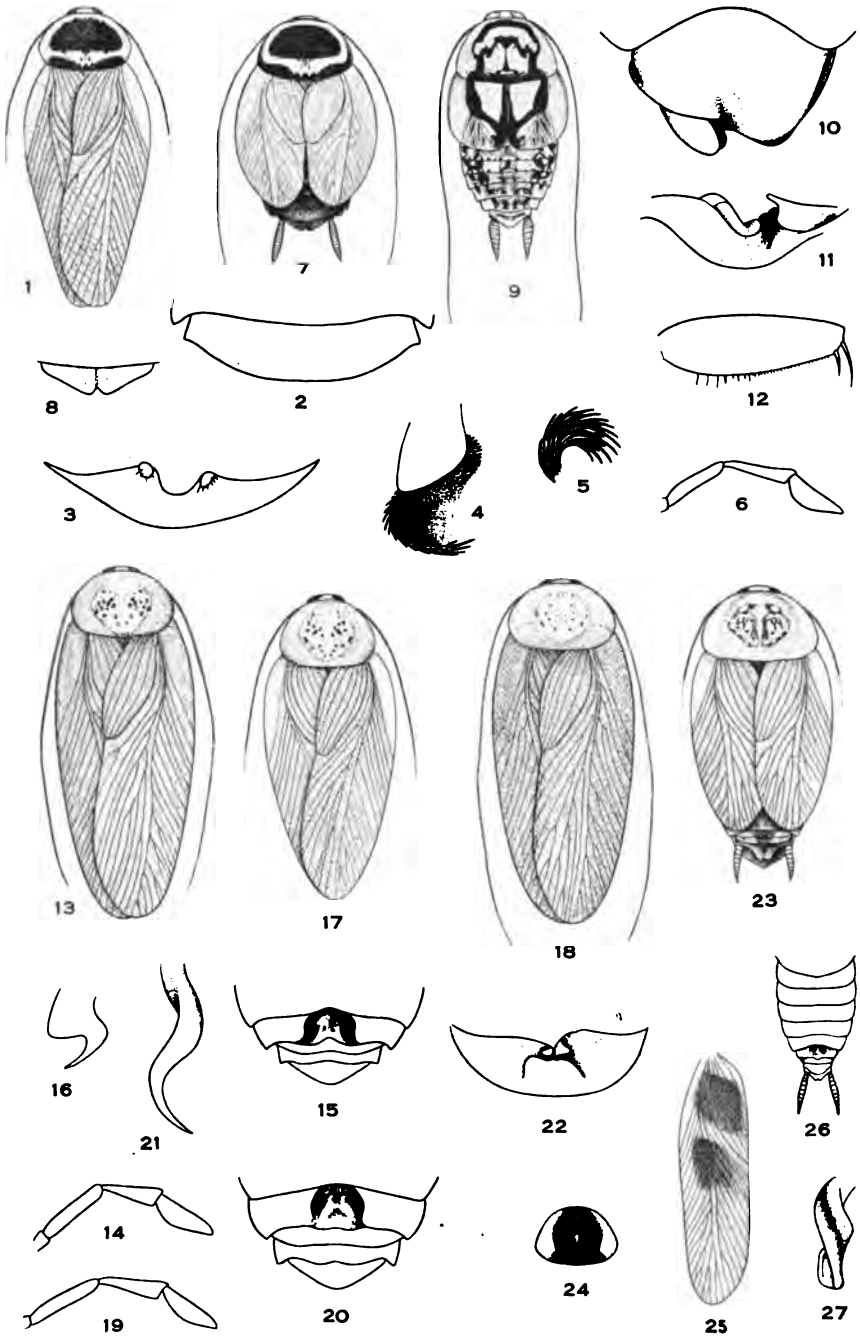

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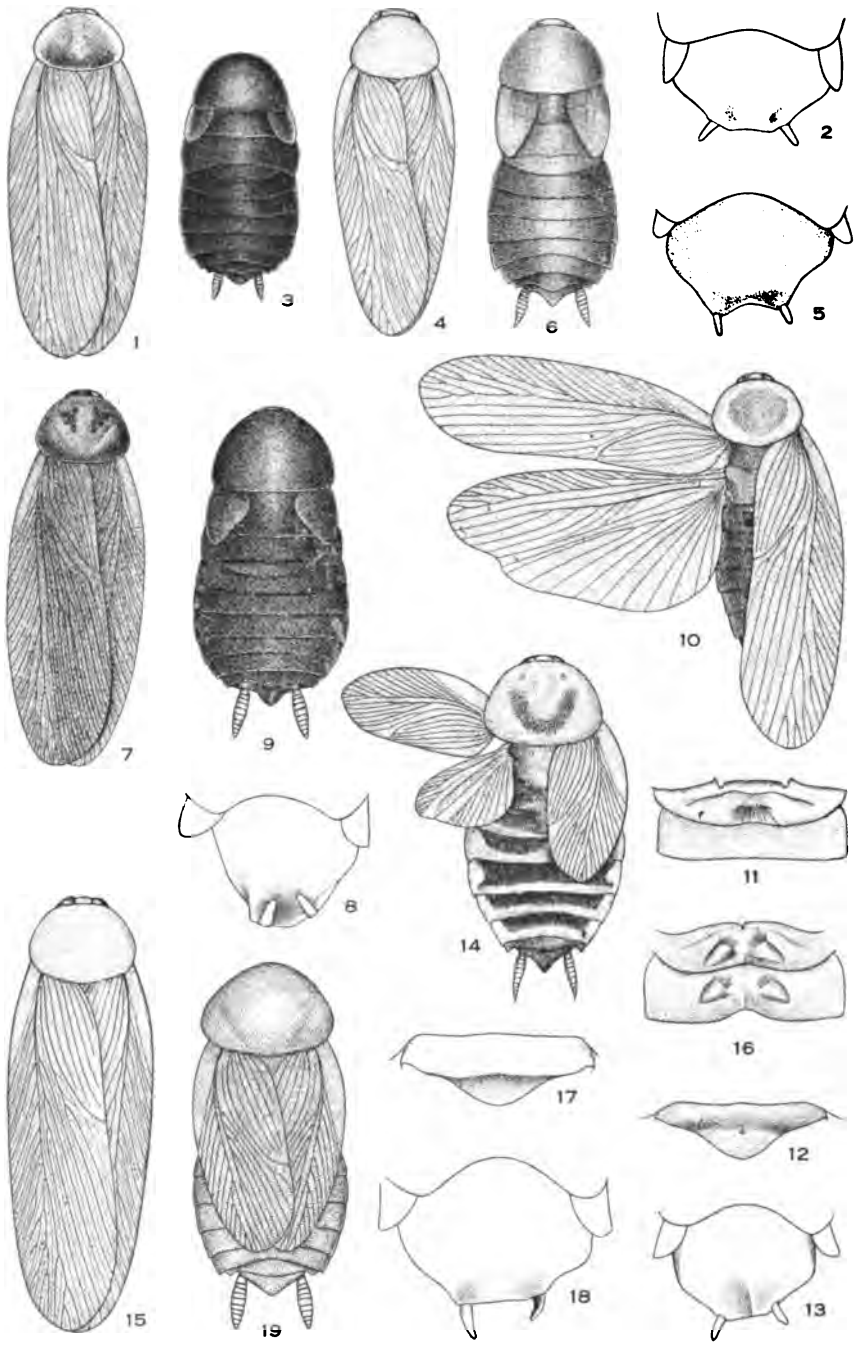

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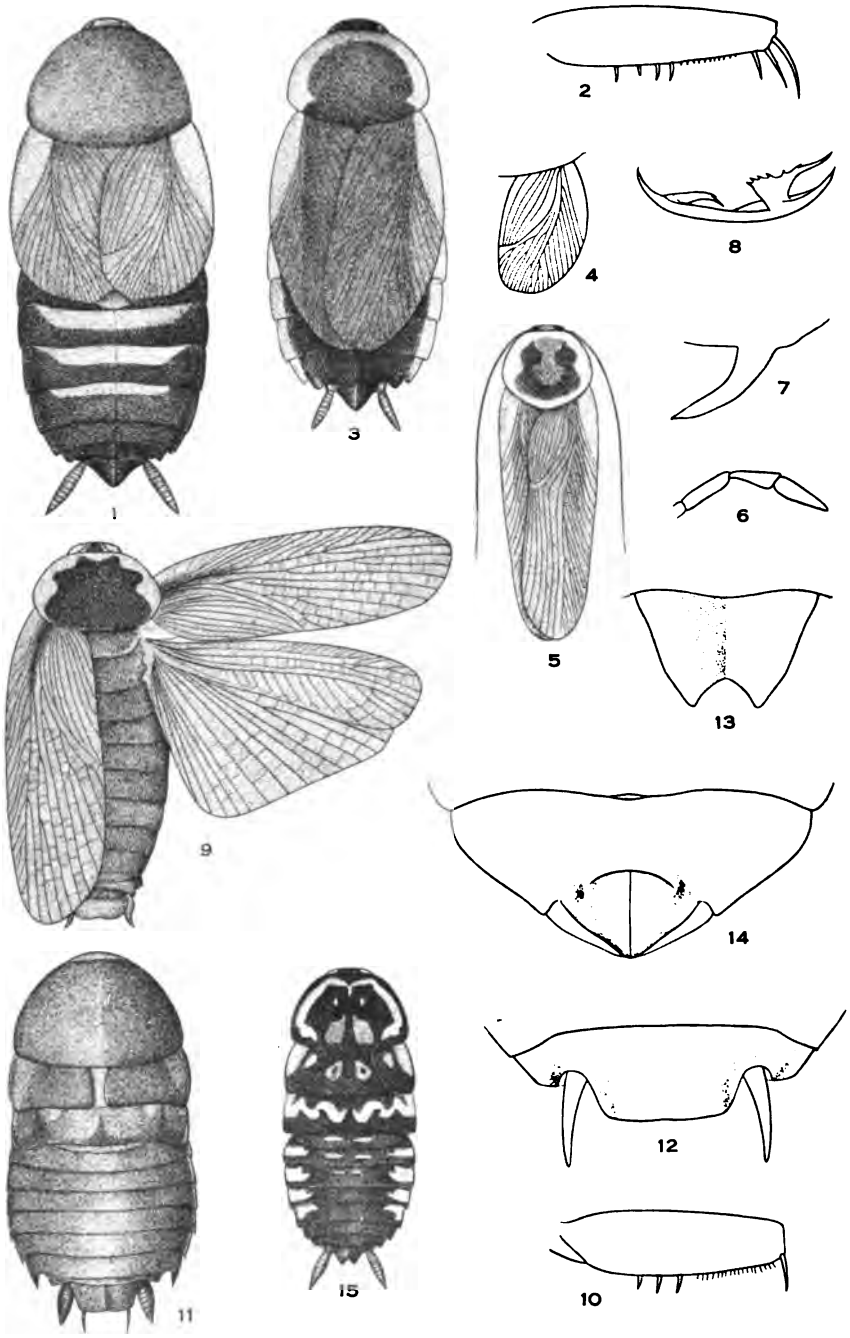

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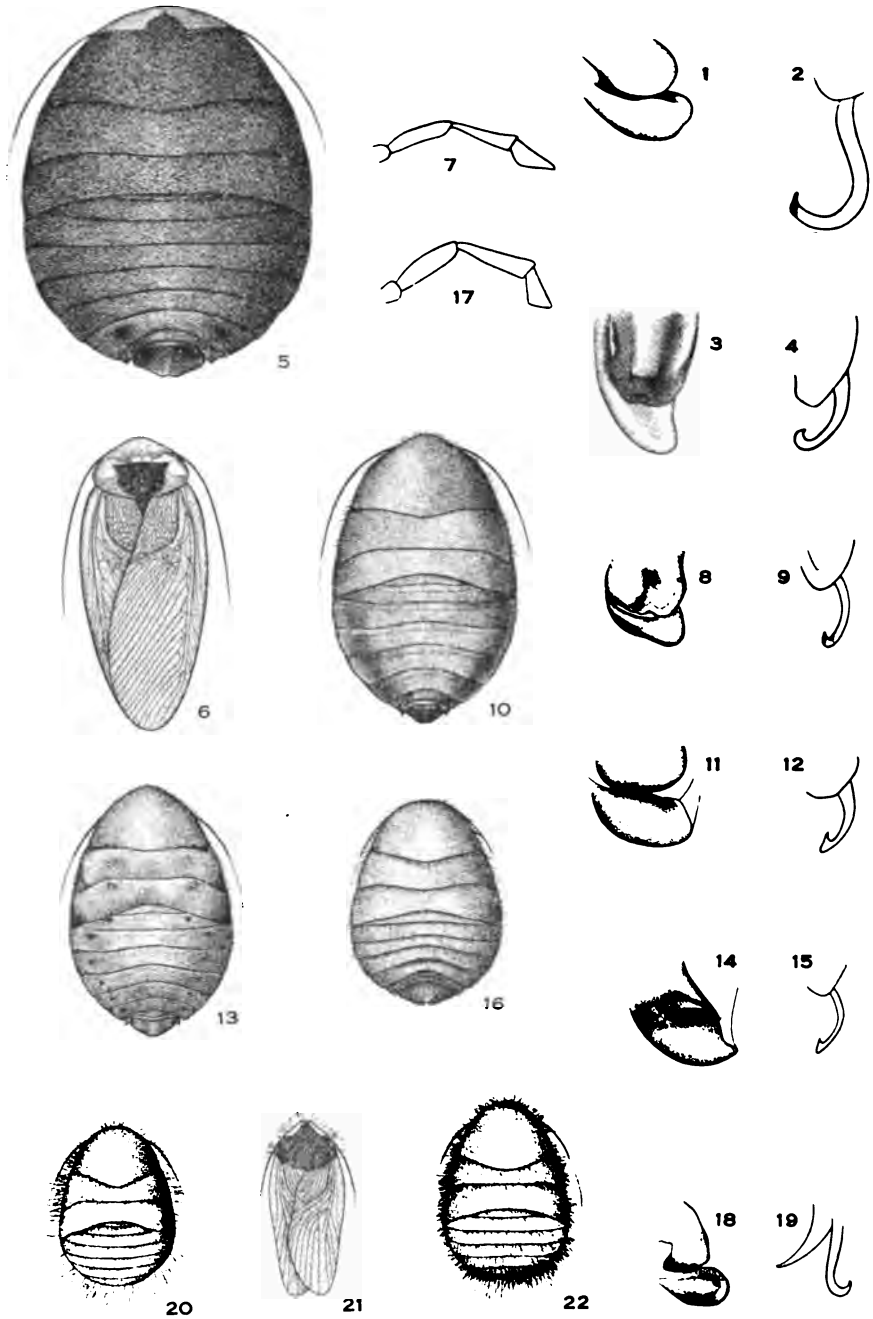

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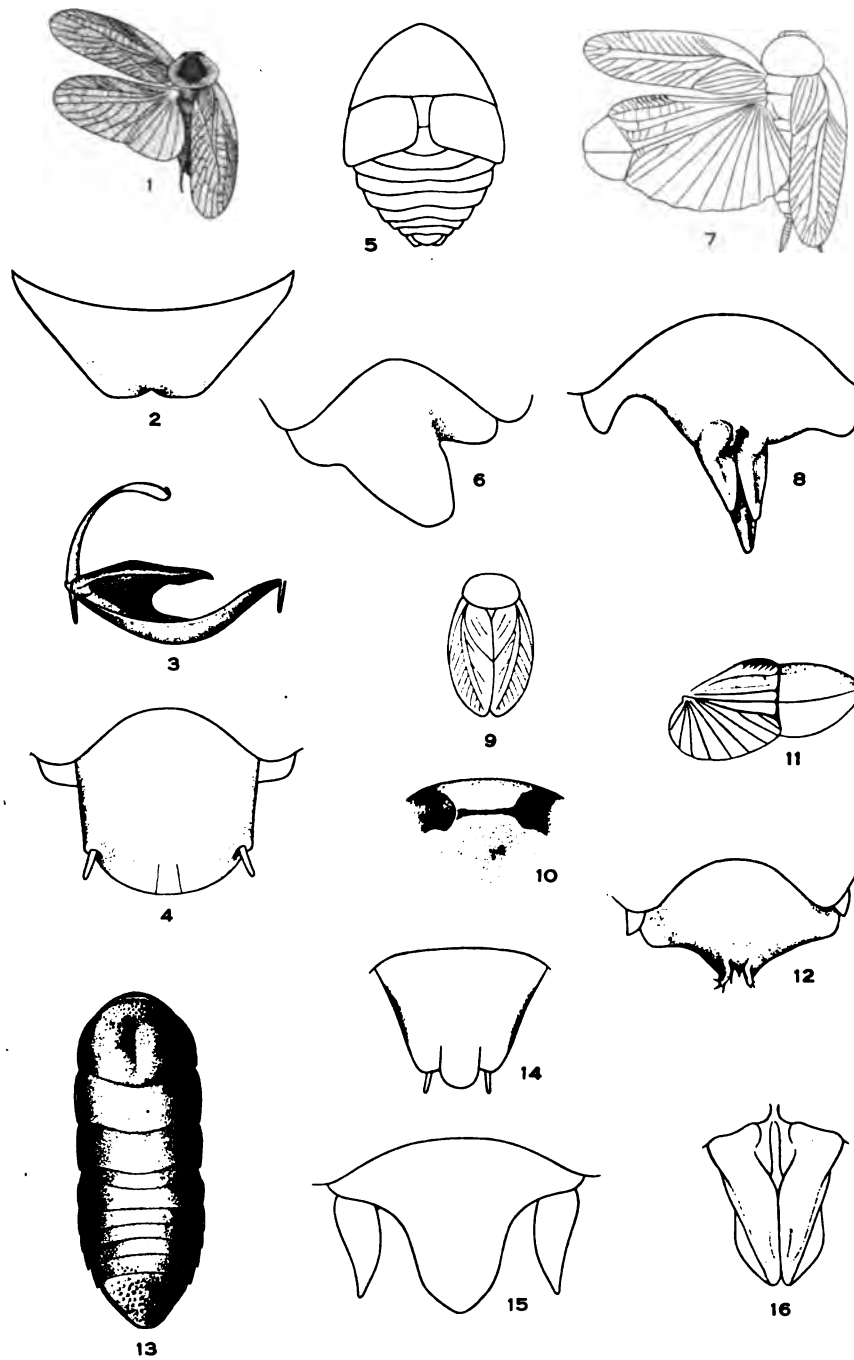

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